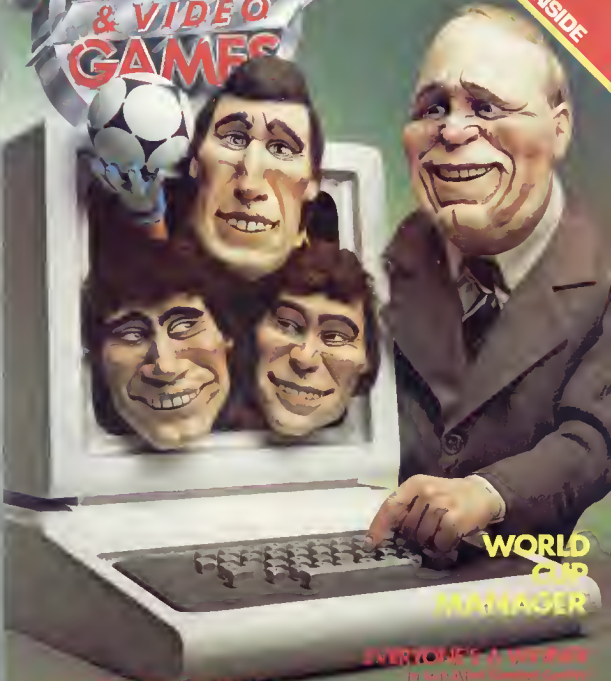


JUNE 1982  
75p

# COMPUTER & VIDEO GAMES

**OWL**  
THE BBC MICRO  
MAGAZINE  
ISSUE ONE INSIDE



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## World Cup

Halftime in the World Cup semifinals and you're 2-0 down to Czechoslovakia...

If you thought that was the kind of pressure which could only be put on Ron Greenwood this summer, you hadn't reckoned with our World Cup Manager game. It runs on the Sharp MZ-80E but without a PEEK or a POKE so anyone with enough memory should be able to convert it.

Your task is to try and win the World Cup, with Brazil. It's hard. With El Salvador, it's heartbreaking — but just about possible.

This is your chance to get Over the Moon or Sick as a Parrot even before the World Cup proper kicks off. Page 32.

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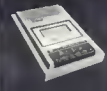
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Capitals of Europe

Assembly/Editor

Microsoft Basic

Video news

Games

Energy Case

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Kingdom

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Basketball

Backpack

Computer Chess

Melissa Command

Space Invaders

Star Raiders

Super Breakout

Humpty Dumpty & Jack

and Jill

Hickory Dickory Dock &

Bee, Bee Black Sheep

British Heritage Jigsaw

Puzzles

European Scene Jigsaw

Puzzles

Darts

Drabage & Dominoes

Snooker & Billiards

Tournament Pool & 8 Ball

Pool

Jump & Jig

Superman Commander

Super Cubes & Tilt

Commercial

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## SINCLAIR'S NEW BABY

Dear Sir,  
I have heard a good deal about the coming of a Sinclair ZX82 microcomputer. Is it going to be out this year and if so will it be compatible with the ZX81. If we ZX81 users can't upgrade our machines into ZX82s, then how much will this new one cost. Please can you help as I have read so many confusing reports about this machine.  
T Robinson,  
Saffron Walden,  
Essex.

Editor's reply: The ZX Spectrum has already gone into production at the rate of 20,000 units a month. Clive Sinclair said it would be available to the public within a fortnight of ordering the machine.

It is on sale in two versions. The 16K memory computer sells at £125, while the 48K machine costs £175 inclusive of VAT. If you want to upgrade the 16K version you can do so by buying an internal expansion board which will cost about £60.

The ZX Spectrum isn't compatible with the ZX81 at present, but all the 81 software will run on the new computer with minor variations. It is only slightly larger than the ZX81 with a calculator type keyboard instead of the memory keys featured on the ZX81.

The ZX Spectrum incorporates high resolution colour graphics, more memory capacity, a sound generator, a 40 key ASCII keyboard and upper and lower case.

Not only is it compatible with ZX81 software it also has a special port for linking up the Sinclair



The Sinclair Spectrum

printer, and can be plugged directly into an ordinary PAL television set.

Clive Sinclair claims the Spectrum is more powerful than most of the microcomputers now on the market — including the B.B.C. models A and B.

The most interesting part of the new computer is the disc drive called the ZX Microdrive, which will be available for the machine in a few months time. Measuring about 4" x 4" it will provide data storage on floppy discs, and the units can be stacked onto each other giving extra capacity.

Although there is no software specially for the Spectrum at present Sinclair plans to introduce some later.

## SELLING SOFTWARE

Dear Sir,  
I am writing to enquire whether or not there is any law preventing the sale of software from a private residence. I have written several enjoyable 16K ZX81 games — including a graphics-adventure — a home management program and a wages calculation program, which I am considering selling on

tape, from home, or if some law prevents this, to a software purchasing company, the quality hopefully being high enough for them.

Please could you tell me how much, on average, these companies pay, and if there is any law concerning the first part of my letter?

Gary Coxon,  
Caverswall, Staffordshire.  
Editor's reply: The only thing that could affect your private sales is the mortgage or rental agreement covering the residence. It might be wise to check this. At the same time you could find problems with the local rating authority if they consider that the volume of business has changed the basic use from residential to business.

However, I doubt if you'll do enough business to worry them, or the VAT man either. You could find problems though if the volume of trade caught the eye of the tax man.

## DEALER'S DILEMMA

Dear Sir,  
In recent months, we have advertised our Byg Bye 16K Ram Pack in your

magazine and in this advertisement we stated that delivery could be expected within 28 days.

However, during the past six weeks, many people who have ordered these Ram Packs have had to wait longer than the stated 28 days due to circumstances beyond our control. Over 25 per cent of the initial batch which we despatched were damaged beyond repair by the Post Office and this has necessitated our having the packaging redesigned which caused the delay.

J. G. Lane,  
Computer Aided  
Printing Services,  
Petersfield, Hampshire

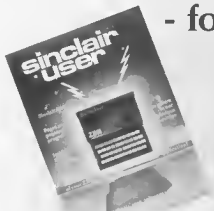
## AUNTIE'S MICRO

Dear Sir,  
I have received your magazine since the first issue, and have noted that there have been no programs dedicated to the B.B.C. micro.

At the moment I am awaiting delivery of my model B, and feel that it is a great pity that this micro seems to have been overlooked within your pages.  
K. Stephenson,  
Cockermouth,  
Cumbria.

Editor's reply: After a slow start, there are now enough B.B.C. Microcomputers finding their way out to the public to justify publishing listings for this machine. Far from "overlooking" the machine we have been very conscious of the need to cover it but felt we had to wait until sufficient machines were available. Turn to the centre of this magazine Mr Stephenson for our first look at what is going to be a very popular microcomputer.

# The best enhancement yet for the ZX enthusiast - for just £9!



What is the best way to guarantee that you never become bored with your Sinclair computer?

The answer is to subscribe to *Sinclair User* - written specifically for owners of ZX 80's and ZX 81's. *Sinclair User* is the latest monthly from ECC Publications, pioneers of *Practical Computing*, *WHICH COMPUTER?*, and *Computer & Video Games*. Whether you bought your system yesterday or are an old hand, you are probably an enthusiast for your machine. And your biggest problem is likely to be obtaining all the information to satisfy your interest. We promise that *Sinclair User* will be devoted entirely to quenching your thirst for information.

Issue one is Published on 1 April and is an absolute must for *Sinclair* devotees. So make sure **you** guarantee that you get **your** copy by taking out a subscription **now**.

As the name suggests, the content will be geared specifically to helping the user. There will be pages of information on available hardware and software. Our expert writers will analyse established products to help

you make the right choice. There will be exclusive pre-release snippets on products which are about to hit the market. Our aim is to make *Sinclair User* invaluable and we will chronicle applications which are of special interest.

For example, in the first issue we will look at business applications and we visit a school where the pupils are having the time of their lives using their Sinclairs. Each month we will carry eight pages of programs. Another must for every user is our first rate helpline service. And we intend to carry as much information as possible about clubs.

Last but not least let us say that the best way you can guarantee you like the magazine is by participating yourself. Don't forget to ask us your queries; send in your programs - for which we will pay £10 if we publish and be sure to tell us if you are using your ZX 81 in a special way. Send in your club news and tell us of any interesting people out there in userland. And just in case you need further convincing, look at the editorial plans for the first six issues.

Can you continue to get the most out of your ZX without reading the *Sinclair User*? So why not fill in the subscription order form **today**?

## Editorial Plans

### April

Hardware overview  
Software overview

### May

The Sinclair 10K RAM  
dissected  
Adventure games programs

### June

Dials - a look into the  
future  
Graphics software

### July

The ZX81 memory map  
analysed  
Debugging programs

### August

The Sinclair printer  
and its alternatives  
Chess programs

### September

Prizes for the enthusiast  
(e.g. colour, sound,  
high resolution, special  
business software  
for the ZX81)

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# sinclair user



# MAILBAG



## CRASHING PROGRAMS

Dear Sir,  
I happen to be one of the many people who received a ZX81 for Christmas. When I key-in one of the games for the ZX81 and start playing, the system quite often crashes, why? It is because it needs a large heatsink then tell me what a heatsink is and where to get one.

When trying to program a Breakout game, I managed to get a ball bouncing around the place and get a bat at the bottom but then I ran out of memory. Could you please put in your magazine an article on saving space specially for the 1K ZX81?

Also on the side of the ZX81 there are some holes for plugs, two of them are for recording but the cassette recorder I have access to have a five-pin socket. Could I take the ZX81 apart and fit a new five-pin socket? I already have a line  
L. Sabane,  
Walmor,  
Kent.

Editor's reply: You don't say whether you are using a RAM pack. If not, then there is something wrong with the system and it should be exchanged. If yes, then make sure that it is well supported and does not get moved whilst in use. A momentary disconnection at the rear will lose all data.

The ZX81 needs a fairly high input/output voltage for record/load. A five-pin DIN socket, as you describe, would probably not give an adequate signal. You must use a tape recorder with phono sockets — just like the ones on the computer.

## GETTING IT TAPED

Dear Sir,  
I am the satisfied owner of a ZX81, finding it more than ample for a home computer. I now wish to purchase a tape recorder solely for use with the ZX81 and wonder if you

could advise me on the best machine to buy

I would be interested to know if the Vic cassette unit would be compatible with the ZX81 and if I could expect better reliability than with ordinary tape machines  
P. Mooney,  
Orpington,  
Kent.

Editor's reply: There are several cassettes on the market, but if you want to be sure about compatibility it is best to get one which was built for use with the ZX81. The ECR81 Enhanced Certified Recorder is available from Monolith Electronics at 5/7 Church Street, Crewkerne, Somerset.

I know better than to say that it is impossible to interface the Commodore cassette unit onto the ZX81 but it would be difficult in the extreme. The unit was built especially for Commodore products. It is best, and more reliable, to use the recorders recommended by Sinclair. If you want a list of these you should get in touch with Sinclair Research.

## OF REMS AND ROMS ...

Dear Sir,  
I am only 13 years old and I took up computing when I first saw your excellent magazine in my newspapers.

I have a few questions to ask. In programs containing machine-code I have seen the particular machine-code routine stored in REM statements but I thought that REM statements were ignored by the computer, so how in the machine-code carried out?

I am thinking of purchasing a new 4K graphic ROM module from DK Tronics. I have heard that it contains a full set of Space Invaders graphics characters, and I am wondering if you could print an 'Invaders' program for people with this ROM?

Would it be possible to adapt my ZX81 to colour? If not I would like you to congratulate the artist who

drew the picture in the Sinclair advertisements, because it is extremely realistic!

Would you please tell me which is better, the Sinclair ZX81 or the Acorn Atom. This is a source of excessive arguments between myself and my friends I don't care what answer you give but please give one!

I think the ZX81 is extremely good value for money because you can buy a ZX81 complete with 16K-byte RAM pack and printer for approximately £170.00 and this is just over the price of a ready assembled 2K Acorn Atom.

Also, although the Sinclair manual is very comprehensive, is there any book I could get which goes into everything?

One last question, is it possible to get a keyboard for the ZX81 with a case that it can fit inside. I like this idea because I think it will look better and improve your programming speed.

M. Sacaloff,  
Bury,  
Lancashire.

Editor's reply: The ZX81 has an interesting way of using REM statements within in line 1 of a program. Any data after the REM are put into a special buffer in the memory.

No doubt when a number of people have purchased the DK Tronics ROM sufficient programs will become available.

The extra cost involved in adapting your machine to colour would probably not justify the adaptation. If Sinclair bring out a colour machine later this year it will probably use ZX BASIC — so upgrading to that would be a better bet.

There are as many books on the ZX81, and most of them leave much to be desired. You will probably have to buy three, or four, to cover most of the possibilities available.

If you look through this, and other magazines, you will see at least six manufacturers of keyboards. Most supply cases to take the ZX81 boards, and at around £30.

## PROGRAMS ON SCREEN

Dear Sir,  
The Games News, Arcade Action, Video Screens and Software Reviews of your magazine are really good and so are the drawings but couldn't we have some photographs of the actual program while it is running? This could also help would-be buyers on which hardware to buy.



Finally, who is the little man holding the book on your January issue with the big snout?

Mr D. Sinden,  
Stroud,  
Kent.

Editor's reply: Game graphics have not always been as exciting and colourful as we might wish. And our early decision to use illustrations instead of screen photographs was based on a belief that through drawings we could capture more of the theme a programmer originally hoped to portray before he was forced to compromise because of limited graphics facilities.

Screen graphics are now reaching new standards and in the future we will not be sticking so rigidly to the illustrations-only policy.

The characters featured on our covers are entirely fictional and any resemblance between the little man with the big snout and persons living or dead, is entirely coincidental.

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# ITION COMPETITION COMI

Can you Beat The Bug on our give-away front cover puzzle and win a BBC Microcomputer?

A much-sought-after BBC micro will be despatched to the winner of our Beat-the Bug competition.

The puzzle can be done without a computer. Just punch out the small tokens on the bottom of the card and place them on the puzzle as indicated. Then the task is to move the data from computer Z into computer A and replace it with the data from computer A.

But there is a Bug floating about to make things awkward. The rules of the puzzle are:

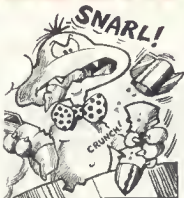
- Move two pieces of data first, then move the Bug.
- From here data and Bug are moved alternately.
- Data can only move towards its destination.
- Only one piece can occupy a location at any time.
- The Bug can move in either direction.
- Moves are along the lines to neighbouring locations.

It may look deceptively easy but it does take some careful thinking to work out the answer. More importantly it should take a good deal of careful thought before attempting a program to solve it. It is more difficult than the four octagons puzzle we set you with in our first issue. The response to that first puzzle took us by surprise — we weren't expecting 800+ solutions — but this time we think we're ready for you.

We are working out a reasonable time to solve the puzzle so please write on your program how long it takes to come up with the answers.

The objectives are first: to produce the best program to solve the puzzle; to find out how many solutions there are; to find out how many distinctly different solutions there are (discounting reflections and rotations) and what the shortest solution is. Finally to discover it is possible to get the Bug to end up in the middle or not.

The program will be judged on the following criteria: Does it run correctly (bug free)? Does it find the solutions? How fast does it



find a solution? Does it find all solutions and how quickly? Concise programming. Good use of memory space. Imaginative algorithms. Is it self contained? Presentation.

Write the program on any sort of computer, or just in plain Basic and send it as a listing or a cassette to us before June 16. We will include a way of solving the puzzle next issue — just to prove that it is possible.

Send it in to Computer & Video Games, Durrant House, 8, Herby Hill, London EC1R 5JB. The judges' decision is final and no correspondence can be entered into.

Make sure you include a name and address and the time the program takes to find one solution. Also be sure to let us know what machine it runs on.

The 15 places in our special free Star-Web game were very swiftly filled after the May issue found its way into the newsagents.

Our 15 computer moderated gamers are: David Johnson of Stoke, Paul Karshee of Littleborough, Steven Draper of Sudbrooke, Marcus Rowland of Westbourne Park, Paul Hardy of St Annes, Anthony Shepherd of Barnsley, Keven Stubbs of Stockport, D.P. Goodman of Stevenage, Jenny Parsons at Strling-shra, I.C. Spicer at West Hamwood, Richard Moore of Wolverhampton, Stephen Loughran of London NW6, Mark Woolrich at Wheatley, Angle Bradley at Birmingham and Bernard Andrews of Manchester.

For the many people who entered but were not lucky, we are looking into the possibilities of running a much larger computer moderated game in the Autumn.



game which proved attractive to women and brought a family touch to the video industry.

In such a male-oriented world as the video industry we wondered if British arcade owners will follow the American business thinking which has since spawned Ms Pacman! Are women worth exploiting? We find out in July.

Imhotep the pyramid builder is our featured game next issue. Upon the desert of the east, the first pyramid was raised and the strain on the entire country was great indeed, can you guide your workforce of 1000s to success in the desert?

Casino Royale, Solitaire and Missile Command also feature — as our games listings.

The Prestel page features a long look at the recent competition to produce a Sinclair downloader. Find out about Telesoftware — it could change the face of personal computing.

The Spectrum will always be the Sinclair '82 to owners of that company's earlier models. It's potential is obvious but is it going to take over from the ZX81 and, if so, how quickly? Our July issue will include a 16 page supplement for Sinclair owners.

From those who still haven't exhausted the possibilities of their ZX80, to those who have a yearning for a Spectrum. Something for every Sinclair user and everyone who has been keeping more than one eye on this innovative company.

Keep an eye out for our July issue at the newsagent or order your copy now.

I would like to take out an annual subscription for the Computer & Video Games magazine for the following: Computer & Video Games, Bletton Court, Bletton, Peterborough PE1 1NDZ

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**Computer & Video Games.**

The magazine that makes computers fun.



# ITION COMPETITION COMI

## WHO'S GOING TO WIN THE WORLD CUP?

In conjunction with the Silica Shop, we are hoping to add a little more spice to your World Cup viewing this summer.

There's a chance to win an Atari 2600 T.V. Games Centre complete with the soccer cartridge, or a £100 to spend at the Silica Shop, one of the leading stockists of T.V. and electronic games.

All you have to do is pick out the World Cup champions, runners-up and the beaten semi-finalist which wins the third place play-off.

If you are spoilt for choice, there will be no shortage of soccer pundits eager to give you their views on the matter.

And you only have to enter to be sure of winning something! For on top of that first prize and two consolation prizes of Atari soccer cartridges or £30 vouchers, there is a £3 voucher for everyone who enters. This can be spent at the Silica Shop, 1-4 The Mews, Hatherley Road, Sidcup, Kent or by mail order.

We're not eligible to enter but if you want our advice it's: Scotland, England and Northern Ireland (but not necessarily in that order). But you may want to choose another combination.

And if, in the unlikely case, that our three make early exits from the competition, then you'll



still have some interest in following the World Cup through to its well-televised end.

You could even key-in our own World Cup Manager game and check to see if your prediction runs true to form.

We have included three World Cup questions which will be used as a tie-break if the result of the competition is so predictable that more than one reader guesses correctly. And we need to know whether you want an Atari system and cartridges or would prefer a voucher, so please fill in all the entry form below and send it off to the Silica Shop. To receive a £3 voucher, include a stamped addressed envelope with your entry.

### COMPETITION RULES

- 1) No employees of Computer & Video Games, Silica Shop, or their relatives may enter the competition.
- 2) All entries must be on the original coupon, not a copy thereof. Entrants must complete the entire entry form to be eligible.
- 3) All entries must be postmarked no later

than June 12th 1982. Any entry which is incomplete, illegible or late will be disregarded by the judges.

- 4) The judge's decision is final and no correspondence will be entered into. In the event of a tie the first correct entry drawn will be the winner.
- 5) Only one prize per entry will be awarded and no cash alternative will be offered.
- 6) Vouchers are redeemable either by visiting, the Silica Shop, 1-4 The Mews, Hatherley Road, Sidcup, Kent or by mail order. Vouchers are valid up to 30th October 1982.
- 7) Winners will be notified by post. A list of winners will be printed in the September issue of Computer & Video Games.

## WORLD CUP COMPETITION

Using your skill and judgement, write down who you think will finish

WINNERS .....  
RUNNERS-UP .....

THIRD PLACE .....  
In this year's World Cup competition?

1) Which country currently holds the World Cup?

2) Which is the only country to have won the World Cup three times?

3) Who is the only player to have scored three times in a World Cup Final?

Do you already own a TV game?

If so which system do you own?

If you win would you rather have the Atari TV Games Centre and cartridges or the voucher?

Game ☐ Voucher ☐ (please tick)

Name: .....

Address: .....

Post Code: .....

Send your entry, enclosing an S.A.E. to World Cup Competition, Silica Shop Ltd., 1-4 The Mews, Hatherley Road, Sidcup, Kent DA14 4DX.

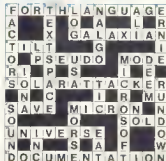
Closing date for entry is Friday, June 12 1982.

## BRAINWARE ANSWERS

The answer to our May Mind Routines problem is Question one, \$011; Question two, there is no solution to this one; Question three, 4,630,907,663.

The correct solution to last month's Nevera Crossword is printed right and the winners' names will be published in next month's issue.

For more puzzles to tax your brain turn to page 17 for this month's Mind Routine and Nevera Crossword.







INSIDE THE MICRO...





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# Brainware



## MIND ROUTINES

Finding the pathway through this alphabet maze should set your braincells buzzing.

Each square contains a letter and a number. The number shows how many squares can be travelled to reach the next destination. You only "visit" a square when you stop at it and take its numeric value for your next move.

Starting from square S (labelled Start) and moving either horizontally or vertically — not diagonally — by the number of squares indicated, you must visit each square on the diagram once.

No square should be visited more than once and you must finish at the G (labelled Goal) square.

For example your path could start: SXDIF...

What path should you take to achieve your goal?

3	2	3	1	4	
A	B	C	D	E	
1		2	3	3	
F	Goal	H	I	J	
3	3	2	2	1	
K	L	M	N	O	
4		2	1	2	
P	Q	R	Start	T	
1	2	3	4	3	
U	V	W	X	Y	

## WIN OUR CHAMPAGNE

The champagne winners for our April issue are hemispheres apart. We have one far from and one close to, home.

The Mind Routines winner is Mr J. Devine from Westville 3630.

Natal in South Africa, who correctly pointed out that the number of stolen bags was 1789.

The Nevera Crossword winner was Mr S. F. Rischer of Russell Court, Woburn Place, London WC1 who was first out of the hat with a correct entry.

Bottles of champagne are on the way to them both.

Two more bottles of champagne are up for grabs this month for the first two correct answers out of the hat for this Mind Routines puzzle and the crossword below.

Please send your entries to Computer & Video Games, Durand House, 8 Herbel Hill, London EC1R 5JB to reach us before June 13.

The answers to our May issue's Brainware problems can be found on page 11.

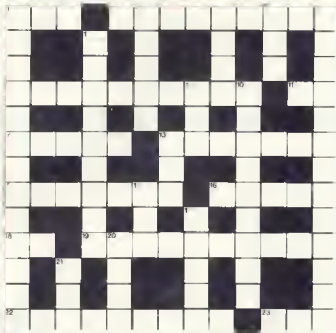
## NEVERA CROSSWORD

### ACROSS

1. Lettuce function (3)
2. Getting the program working with gravity on the end of the french insect drink (9)
8. Game for a school teacher's brain (10)
11. Ego initialisation of data (2)
12. Ten inside ten buck and one for 1 terminator (4, 1)
13. Jubilee LF CR? (7)
14. Flags produced by Vic (7)
15. Jump the beginning of the program (5)
16. Toot missing the ducks race (2)
19. Take off the centre forward in naval warfare game (3, 7)
22. Syntactical significances not at charges (9)
23. Annoy the glitch (3)

### DOWN

1. Letter sent by modem (13)
3. Gateway to the program? (5)
4. Comic proceed after break (4)
5. Pint without quiet function (3)



6. Play Wizard's Quest for example, going around coming high class King (2, 11)
7. Circular motions mixed into rotas (9)
9. Anger clipping point from the wire (3)

10. Enterprising crystal (9)
13. Our latin GINO system content (3)
15. Polish and erase (3)
17. Go-a singular ?? (1, 4)
20. One piece of hardware (4)
21. Basically assign or rent (3)

# NEW PRODUCTS NEW PRODUCTS NEW PRODUCTS NEW GAMES NEWS

## MASTERMIND THE DEFEAT OF WARLDRS

VICSOFT 7

Control Technology have just brought out seven good quality games programs on one cassette.

The first of these is Breakout — an extremely colourful version of the game with good sound effects.

Deathrace 2000 is the second game on the cassette. It is based on the film of the same name. During the game you have the unfriendly task of knocking down as many pedestrians as you can.

Sounds is a men-driven program and is for more serious use than the other games on the cassette. It can produce all sorts of sound effects from sounds of nature to engine noises.

In Menoids you have control of an astronaut and you must dodge the asteroids that hurtle by him at terrific speed.

The Mastermind program runs along the lines of the original board game and is in full colour.



Squash could turn you into a champion or make you feel like a born loser — just like the real thing.

Finally, Warlords turns you into the master of a castle that is being attacked with huge boulders. You have to try and stop these boulders from demolishing your castle.

Vicsoft 7 is available from Control Technology on cassette. It costs £5.95 and runs on the unexpanded Vic-20.

## BEWARE THE WANDERING WUMPUS ...

WUMPUS

The Wumpus is a deadly creature which lives in a cave system and no-one has ever seen a live specimen.

This is because the revolting Wumpus must be successfully tracked down and shot before the hunter actually sets eyes on him.

Suddenly the Wumpus is a very sought after creature. It smells abominable, but that can help the Wumpus hunter.

The object of Sharpsoft's new

version of Wumpus is to search for and kill the Wumpus. But your quest is made more difficult by deep pits and Snorl bats.

At any time you may tumble into a pit and plunge to your death.

If you manage to miss the pits a Snorl bat may swoop down and pick you up. Once again you could find yourself falling into a pit, or into the open mouth of the Wumpus.

One concession you are given is an "I smell a Wumpus" warning when you are one of two rooms from the beast.

When you encounter the Wumpus you have one chance to shoot it with your crooked arrow, or die in the attempt.

Wumpus comes from Sharpsoft and the cassette costs £5.85.

## SURPRISING ATTACKERS

Critics of the ZX81 would not believe that an arcade game such as Galaxians could be transferred to the Sinclair — but now it has happened.

ZX Galaxians has all the usual features of the game. The Galaxians move across the screen and you have to hit them with bullets from your base ship at the bot-

ZX GALAXIANS

tom of the screen.

The Galaxians swoop down in random formations and drop bombs, trying to destroy you. You have four lives which are indicated on a scoreboard at the right of the display.

The board also shows you who has scored the greatest number of hits in a game. The Galaxians also have the knack of surprising the player. One minute you think that you have nearly finished them off and the next more Galaxians arrive.

If you manage to score more points than anyone else has the computer will ask for your name and will display it in the highest score box until someone else beats it. The graphics are very good.

ZX Galaxians runs in 16K and is available on cassette from Arco Computing. It costs £6.95.

## WALKING THE STREETS OF SHAME

It's naughty but nice! Holdco has brought out a game called The Naughty One which allows the players to indulge in all kinds of illicit activities in bars, gambling dens, and houses of ill-repute.

You can earn yourself a slave or get parts of your opponents' bodies. But paper money will not buy what you want — you have to use items of your own clothing.

The bank manager is no pin-striped figure of respectability either. He is a pawnbroker. If you get into debt with him you could lose all your clothes.

THE NAUGHTY ONE

You can undress your opponents by gambling for their clothes, in auctions set up by the pawnbroker. You can go into big business with such profitable enterprises as massage parlours or worse.

You can also give out naughty tasks for other players to perform. But be careful! The other players can do all these things to you.

But this is a game in which you can lose more than your clothes.

You could also be seduced — and there are a few other surprises in store.

The Naughty One is produced by Holdco. It comes in two versions. The mini or cassette version is available for the Atari and the ZX81 at £9.50. The mini version comes on diskette and requires 48K. This is available for the Atari and Apple II. It costs £24.50.



## NOW FIND A FRIENDLY MONSTER...

### SWORD OF PEACE

The king of a far off country has died and as his heir you must prove your worth by going down into a maze that is crawling with monsters.

Artic Computing's *Sword of Peace* is a classic adventure game. You must move around the maze, entering sets of move co-ordinates, to find the objects of state. These include the Orb of State, the Robes of State, and the Sceptre — and finally the *Sword of Peace*.

The game is played on several different levels. When you find an object you are automatically



translated to the next level of the maze.

The monsters are divided into two categories: good and bad. You can actually have a good

vampire! To begin the game you are given a series of four spells which you can use against bad monsters.

Your first two encounters with

good monsters are very advantageous. Firstly, you are given a direction metre. This tells you the number of moves you are away from an object. Nothing is ever that easy though.

The direction metre only gives you one number to use. For a co-ordinate fix you need two, so you do not know whether you are moving in the right direction.

This is remedied in your second encounter with a good monster. It will give you a direction metre which shows two numbers. This shows you the number of moves you need to make in each direction before coming across the object. Combined with the first metre it is invaluable.

Good monsters can also teach you spells. They are not guaranteed to work and you can lose a lot of points during battle. When you have been through all the levels of the maze, and have all the Objects of State you can exit and are proclaimed as the new king.

*Sword of Peace* runs on the ZX2Bt 16K, and is available from Artic Computing. The cassette costs £5.95.

## HOW THE KINGS AND PAWNS COME TO LIFE

Many people have complained about the graphics capability of the ZX81. Now the seemingly impossible has happened: you can play high resolution chess on a Sinclair.

ZX Chess needs a few pieces of hardware to produce the graphics, but the effect is really startling. The board display shows in clear detail actual chess pieces as they look on a real board and not just capital letter representation.

The hi-res graphics version

### ZX CHESS

needs three pieces of hardware. These are the Quicksilver moths, beard, connector, and character generator. The price of these items is not too high for the effects that you can produce.

It is also possible to play ZX Chess 2 without the enhanced graphics. There are seven levels of play. Four of these can be used within competition time limits. You get the option to play black

or white using all the legal moves including an en passant.

ZX Chess needs 16K and is produced by Artic Computing and is available at £12.99.

## EVERY ONE A WINNER!

### OTHELLO, CHEQUERS AND CASINO

Kuma Computers are really confident about their new versions of the three oldies for the Sharp MZ-80K. They want to know who the first person to beat their Othello or Draughts is.

Othello boasts good quality colour graphics representation of the eight playing board and 64 double sided playing counters.

The game is between you and the computer. As well as the good graphics the game also has a quick response time and does not keep the player waiting too long when making a move.

The Sharp version of Chequers, or Draughts, also has a good response time. The colour graphics are good, showing the traditional checkered board and pieces.

Finally, Casino is a new version of a game of Craps. Craps is essentially an American game which is played in the glittering casinos of Las Vegas.

If you fancy yourself as a gambler and cannot afford the airfare to

LA then this game is for you.

All three games are available on cassette from Kuma Computers. Othello and Chequers cost £10.50 each. Casino is £5.50.



## THE EMPIRE STRIKES BACK

### THE FALL OF THE ROMAN EMPIRE

Nero fiddled while Rome burned — but now there is a chance for you to change that city's history.

The Fall of the Roman Empire transports you back to Empoa during the dangerous days of 401 AD. It allows you to play at being a Roman emperor for 30 years, or turns.

You have control of the vast legions of Rome and the cities that you have gained by conquest. The people of those cities must pay taxes to you.

The only problem that you have is the little matter of invading Huns, who launch attack forces at you from Germany.

They attack your troops and cities, murder the people of your cities and burn the buildings.

From those cities that escape the Huns you may raise taxes to pay for damage done by the attackers. You can also replenish your battle weary troops, building them up for another confrontation with the enemy.

The game gives you 30 years in which to either rise or fall. You could find yourself reliving rather than changing history.

The Fall of the Roman Empire is supplied by Program Power and is available on the Acorn Atom. The cassette is available for £6.95.

# MAZOGS



## A MAZE ADVENTURE GAME FOR sinclair ZX81

**MAZOGS** is a brand new game for the 16K ZX81, unlike any other game you've seen on the ZX81. This is without doubt the best game available for this computer, and if you don't believe us, ask somebody who has seen it, or go down to your local computer shop and ask for a demonstration.

MAZOGS is a maze adventure game with very fast-moving animated graphics. A large proportion of the program is written in machine code to achieve the most amazing graphics you have ever seen on the ZX81.

You will be confronted by a large and complex maze, which contains somewhere within it a glittering and fabulous treasure. You not only have the problem of finding the treasure and bringing it out of the maze, you must also face the guardians of the maze in the form of a force of fearful Mazogs. Even if you survive their attacks you could still starve to death if you get hopelessly lost. Fortunately, there are various ways in which you can get help on this dangerous mission.

There are three levels of difficulty, and the game comes complete with comprehensive instructions. The cassette on which the game is supplied is of the highest quality, and loading is guaranteed.

Mazogs is available from Bug-Byte and most good computer shops at £10.00 inclusive.

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# NEW PRODUCTS NEW PRODUCTS NEW PRODUCT GAMES NEWS

## DON'T GET RATTY IN THIS MAZE

### RAT RACE

When it comes to sniffing out a ripe gorgonzola, there's a new breed of Commodore mouse which is positively radar equipped.

Mind you, he has to be to survive in the dangerous mazes of Rat Race. One of the most compulsive and well conceived computer games around, Rat Race owes a great deal to the arcade game Rally X. Only the theme has been changed. Instead of mong cars the combatants in Rat Race are a lone mouse and deadly rats and cats.

The mouse's aim is to survive long enough to consume every cheese in the maze. And he sits off at a cracking pace with three rats in close pursuit. To throw the rats off his trail he can lay a false scent which confuses them and gains him time. But use it sparingly as it takes up valuable time.



There are 10 cheeses in the maze, the first is worth 100 points, the second 200 and so on. But there is one super cheese which is worth twice the normal value and it is advisable to eat this one first as it doubles the score for all the remaining cheeses.

When all 10 cheeses have been eaten the mouse is given a bonus score for remaining time.

But you couldn't have a mouse game without a sprinkling of cats.

The black cats are sprinkled

through the maze, and although stationary, they must be avoided or they will cost you one of your three lives.

An ordinary mouse could not be expected to live for long in this environment but the Mousus Commodorous has evolved a sophisticated radar system which displays the whereabouts of cheeses and rats.

The game comes in cartridge form for the VIC-20 and is produced by Commodore. It is available from its dealer network at £17.35 plus VAT.

## JELLYMEN ARE A REAL NIGHTMARE

### JELLY MONSTERS

Children's parties will become a much more sinister affair after playing the game Jelly Monsters.

The VIC-20 version of Pacman goes under this name and features the monsters on its cover — and a pretty nightmarish bunch they are too.

With a maze full of dots, four monsters and four large voracious dots the game follows the Pacman format.

The small dots are worth 10 points each, the large dots are 50 points each and whenever one of these is eaten, the chasing Jelly Monsters turn blue and you have a brief respite from their constant pursuit.

This is your opportunity to chase and eat them.

This is a Commodore cartridge for the VIC-20 and joins a growing library of games in this form, presently standing at eight. Also new out are Road Race and Star Battle.

Road Race gives you a set time to travel as far as possible up a winding road, marked only by posts on either side. It is similar to the night driver arcade game.

Star Battle is the equivalent of Galaxians with a hovering group of bat-like space creatures flying in formation at the top of the screen and a lone laser base firing from the bottom.

The Commodore plug-in RDM cartridges cost £17.35 plus VAT.

## ESCAPE FROM A DOOMED PLANET

Watch out for this mammoth new game for the Apple II. Coiled Time Zone II lives on six diskettes and allows the player to travel in time over several million years.

The Earth is threatened with a war that it cannot survive. As a citizen of the planet you avert your doom outside your house. The year is 1981 AD.

Near the house is a meadow

### TIME ZONE

which you go to investigate. There is a strange round object in the middle of the meadow. You walk up to it and look round it cautiously.

There is a door in the side of the object. No-one seems to be watching so you gently push the door open. Suddenly reality

becomes blurred and you find that you are in time capsule. You could be transported anywhere.

The makers say that the game could take anything up to a year to play as both sides of the diskettes are used in the game, so you would need a lot of time on your hands in order to play it properly.

Time Zone is available from SBD software and costs £49.95.



# TV GAMES CENTRES TV GAMES CENTRES TV GAMES C VIDEO SCREEN

## BECOME A KING OF THE ICE

### ICE HOCKEY

Experience the excitement and rough and tumble of ice hockey and without collecting the bruises.

Ice Hockey sticks to the traditional idea and comprises of two teams playing with a puck on the ice rink. It's quite possible for the players to finish the game in a bloody fight — which often happens in real life games! It's even more likely with the absence of a referee and without any penalties given to the teams.

Both teams have a goalie providing defence and a forward player to perform the attacking role. The puck can be passed from player to player and each one can shoot from various angles.

The players have a number of tricks up their shoulder-padded sleeves to outwit and out-maneuvre their opponents. They can knock each other down in an unsportsmanlike attempt to take possession of the puck, they can tackle in a variety of ways by body checking, and tripping and they can also use their stick handling technique to win the ball.



There are also game variations allowing you to speed up the

movement of the puck for an extra test or slow it down.

Ice Hockey is produced by Activision for use with the Atari Video Computer System and will be on sale from stockists in June. It costs £26.95, which is more expensive than others because of the extra memory used in writing the game and the greater sophistication achieved.

## ATTACK OF THE ALIEN MARAUDERS

### GALAXIS

An advancing troop of alien marauders armed with deadly laser weapons are attacking your space rig! You must destroy the aliens before they get your ship.

In *Galaxis* you must fight off wave after wave of invading creatures.

This game is a version of the arcade game *Galactica*. Your ship is given three chances to build up the highest score possible. A series of invaders move across the top of the screen and suddenly peel off in formation swooping down towards you.

Mother ships also join up the invading ranks and these perform a similar swooping action in an effort to out-maneuvre your space fighter.

Bonus ships are given when you reach a certain number of points and the game gets more difficult as it progresses. The more aliens you blast out of the sky and the more waves you complete the faster the subsequent attack will be.

This is the latest game out for the Interton VC4000 television games centre. It's a 4K ROM cartridge and can be found at Interton stockists for £19.95 from June.

## POWER IS THE NAME OF THIS GAME . . .

A world war is being waged with one country trying to conquer the earth.

Two armies battle it out both on the video screen and on a board in this second game in the Master Strategy series for the Philips 67000 games centre.

In *Conquest of the World* a knowledge of strategic playing is vital. The object of the game is for the two opponents to capture as much enemy territory as possible, using armies made up of tanks, battleships and submarines not to mention troops.

### CONQUEST OF THE WORLD

This is the follow up cartridge to *Quest for the Rings* in which you use a game board to position your armies and work out logistics, while you watch land and sea battles take place on the screen.

The theme of this war game is a confrontation between the world's super powers in a bid to achieve world dominance. Representing the real life isolation ships of countries during the

early 1980s is the board, mapping out the line of the land and the deployment of forces. Using the game board you can keep track of the whereabouts of all your troops.

When one of the players has conquered the other and achieved the position of world leader the game is over.

*Conquest of the World* is scheduled for a June release by Philips in the UK. The price will be £30.00 approximately.



# ES CENTRES TV GAMES CENTRES TV GAMES CENTRES VIDEO SCREEN

## ARCADE ACTION FOR ADVENTURERS AND SPACE ACES

Atari is sticking to the winning idea of producing versions of popular arcade games.

Defender is scheduled for release during the summer months and is a rendering of the arcade favourite. Planning to attract fans of the original game Atari is bringing out a similar version which will sell for £79.95. One of the more expensive games but it should be one of the more sophisticated.

Yar's Revenge should coincide with Defender's release date if

### DEFENDER, YAR'S REVENGE, EUTOPIA, SPACE WALK

things go according to plan. This game is for gamers with a taste for Adventure but further details are still under wraps.

It promises to be a test for experienced Adventurers though and also falls into the more expensive price bracket.

A game shrouded in mystery is due out from Ace for the Intellivision television games centre. Called Eutopia it tells of the story of two islands positioned in the

middle of an ocean. The object of the game is to take command of the two islands, thwarting the opponents positions.

You have at your disposal numbers of men who can be deployed at various tasks. Your men can either build tactical plants or build shipping fleets.

For each conquest you make points are up for grabs. Depending on the condition of the frame, or the playing area, the score

differs. To further your cause you, as the ruler, can plant troops on the opposition territory. Ace expects to sell this cartridge for £24.95.

Likewise Space Walk, the other forthcoming addition to the Intellivision software series. With four levels of skill to test your space adroitness you can blast various meemies from the skies.

There are a number of alien ships and beings for you to fight — including the deadly space amoeba, and the rainbow bubbles which are filled with a lethal astrogas.

Both these games should be in the shops by the end of July, both retailing for £24.95. G7000 owners should keep their eyes peeled for a new addition to the games range. Already out in America Monkeys is a game set to be a barrel of fun.

### HOME ARCADE

controllers because they consist of a circular disc with which you make your manoeuvres. Others use a joystick device.

Retailing at around £89 Home Arcade follows in the footsteps of Hanmax's other video games centre, the Interton VC4000. According to Hanmax the new centre is based on a more advanced system than the Interton.

Software for Home Arcade springs initially from a Hanmax team who then pass it on to an American sub-contractor which designs and writes each program. The manufacturing process is taking place at the firm's Swindon factory.

Scheduled for launch in June are versions of Phoenix, Defender, Crazy Climber, Pacman, Galactica and Bosark.

Plans are afoot to continue bringing out new games cartridges for the new games centre which will be of an equally standard and meet public demand. Future releases include Centipede, Jungler and Gales.

At the same time Hanmax will carry on marketing the Interton VC4000.

## WHEN THE WEST WAS WILD!

### STAMPEDE

You'll feel right at home on the range in front of your video screen as you attempt to lasso a stampeding herd of cattle.

That's the idea in a newly released Activision game for the Atari video computer system. Out in the Wild West the number of cattle you owned represented your wealth. In this game you have to keep that number high.

You control a cowboy riding the range equipped with a lasso. He can only ride on the left hand side of the screen and at the press of a button he unleashes his lasso to capture a steer.

This requires a good deal of hand and eye co-ordination to judge the distance to successfully rope a steer correctly. The screen is filled with multicoloured cows stampeding the range and for each one you lasso you score a varying number of points.

Don't let any of them dash past your mounted cowboy and escape his rope, it means lost points. Your cowpoke can stop the galloping cattle either by roping them or by riding up close to a cow and nudging her back.

Misadventures in the herd make things more difficult. They don't move at all so are bound to wander off to the left hand side of the screen eventually. These yearlings must be lassoed or



you miss out on points.

The magic score to reach is 1,000. Then you automatically receive a bonus horseshoe. Go for the black mavericks to quickly build up your points as they are worth more than others.

The cows move at different speeds and there are interesting features written into the game. When your cowhand's pony runs into a stray steer he'll give an almighty buck, and if he stumbles on a rock he'll trip up.

Venous skill levels are available and on the higher levels the cows move so quickly it really does become a stampede. The Stampede is available from Activision stockists for £19.95.

## FAMILY FAVOURITES

Keep your eyes open for a new home games centre dedicated to arcade games.

Called the Hanmax Home Arcade Centre it will be on sale at the end of June.

Swindon based Hanmax is launching its new system with a total of 17 games cartridges, six of which are versions of money-spinning arcade favourites.

The Home Arcade incorporates the handsets used by the Mattel Intellivision centre. These differ from conventional hand

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Prices and offers were prepared many weeks before publication of this magazine and whilst every possible effort will be made to meet our offers, in some cases prices may fluctuate and we would advise you to confirm by telephone before ordering.



# CHESS



There is more to chess problems than: What Happens Next? It is also possible to ask: What Has Happened?

I tell you with two "retrograde analysis" problems last issue with an invitation to look back into the history of the position.

In figure one, the problem is which side made the last move? As with many retrograde analysis problems, the key to solving it is to ask what was the last move. If you try this you will find that white has no legal last move — e.g. Pawn from b4 to b5 is not a possibility — why? But Black has several — e.g. Kd4-c5. So Black moved last.

It might seem that programming a reverse move generator for Chess is straightforward, but in fact it is extremely awkward.

Suppose that White has a Bishop on c8 say. It could have reached there by an ordinary move or by a capture. Alternatively it could have moved to c8 as a promoted Pawn from c7 or as a capture with promotion from b7 or d7.

A Black Pawn on g6 might — in general — have reached there from f7, g7 or h7 but the one on g6 in figure one has obviously come from f7. How can this obviousness be programmed?

As part of an artificial intelligence (A.I.) project, a researcher in Bitol, Brian Alden, has recently written a program which reasons out the solutions to quite a number of retrograde analysis problems.

Among the routines used by the program are the following:

PCMOV: generates possible reverse moves for a specified side

LEGCHK: checks legality of reverse moves

ISKCHK: tests whether a King is in check

KCHECK: identifies moves which could have placed a King in check

WHPCAP: determines which men could have been captured on a specified square

CPGTOB: tests whether any pieces are constrained by the Pawn structure

The initial version of the program was written in RT-11 Macro for PDP-11 computer and occupied approximately 5K words of memory. A much improved and extended version in POP-2 for a DEC-20 computer is currently being developed. Neither program is commercially available.

As an example of the program in action, here is how it solves last month's second challenge problem.

In figure two, the lightmost Pawn has been carelessly placed between squares g2 and h2. Where should it be? It is White to move and you know there have been no under-promotions.



Fig 1



Fig 2

To arrive at a solution the program performs the following chain of reasoning. Since Black moved last, PCMOV generates all possible reverse moves for Black, namely Nb1-a3, Nb1-d2, Nd1-b2, Nd1-e3, Kc2-d2 and Kc2-b2.

LEGCHK now checks the legality of each of these moves.

● The Knight moves all place the White King in check, so these moves are eliminated.

■ Kc2-d2 places the Black King in check by White's Bishop on c1 — detected by routine ISKCHK. Routine KCHECK cannot find any legal way in which White could have delivered check, so the check is imaginary and Black's move is eliminated.

■ Kc2-b2 also places the Black King in check. This time KCHECK returns the following possibilities as to how

such a check could occur. The White Rook could have moved to b5 — possibly with a capture. A White Bishop or Queen could have moved from b3 to c2, to uncover check, and then be captured by the Black King. A Knight move from b4 to c2 is impossible, since two White Knights are still on the board and there have been no underpromotions.

The Queen moves from b3 to c2, Rook moves from b3 or b4 to b5 and non-capturing Rook moves from c5, d5 or e5 are eliminated, since in each case ISKCHK returns the information that the Black King is still in check. This leaves only a Rook capture from c5, d5 or e5, or a Bishop move from b3 to c2 as explanations of the check on the Black King.

Next, WHPCAP is used to determine which Black men have been captured on b5.

● The captured man cannot be the Black Queen's Rook, since that piece is found by CPGTOB to be constrained to move on squares a8 and b8 only.

■ It cannot be the King's Bishop, since that piece moves on the wrong colour squares.

● It cannot be a Queen or a Pawn, since either case White would have been in check and there is no previous legal move by Black which would eliminate this check.

This exhausts all possible captures on b5.

This leaves only one possibility: Black's last move was with the King from b2 to c2, capturing a White Bishop which has just moved from b3, discovering check.

The home square of this Bishop is f1. If the carelessly placed White Pawn were on g2 the Bishop would be constrained and unable to leave f1 to be captured. The White Pawn must therefore be on h2 in figure two!

By Max Bramer

# ARCADY SOFTWARE

## DYNACOMP

**FOREST FIRE!** Using excellent graphics and sound effects, this simulation puts you at the middle of a forest fire. Yearning to direct operations to get the fire under control, you'll be charged with water and hose. Not grasping while competing for charges will result in starting a forest fire. Life-like variables are provided to make FOREST FIRE! very suspenseful and challenging. No two games have the same setup and there are 3 levels of difficulty. **24K IC1 £25.95**

**NOMINOES JIGSAW** A game puzzle is your computer! Complete the puzzle by selecting your pieces from a table consisting of 60 different shapes. NOMINOES JIGSAW is a virtuoso programming effort. The graphics are superb and the puzzle will challenge you with its three levels of difficulty. Scoring is based upon the number of guesses taken and by the difficulty of the board set up. **24K IC1 £19.95**

**INTRUDER ALERT!** This is a fast paced graphics game which places you at the middle of the "Droider" having just stolen its piece. The droids have been stolen and are directed to destroy you at all costs. You must find and enter your ship to escape with the piece. Five levels of difficulty are provided. INTRUDER ship to escape with the piece. Five levels of difficulty are provided. **16K IC1 P1 5.95**

**CHOMPLO! CHOMPLO!** is really two challenging games in one. One is similar to NIM, you must be the first to eat a snake, but avoid taking the poisoned piece. The other game is the popular board game PLEVEPI. It fully uses the Atari 2 graphics capability and is hard to beat. This package will run on a 16K system. **16K IC1 £19.95**

**TRIPLE BLOCKAD! TRIPLE BLOCKAD!** is a two to three player graphics and sound action game. It is based on the classic video arcade game which millions have enjoyed. Using the Atari system, the object is to direct your blockading line around the screen without rising up late year opponents! Although the concept is simple, the combined graphics and sound effects lead to "high action". **16K IC1 £12.95**

**SPACE FLEET** Use the game paddles to fire the plane of the TV screen to "kill" a ball into the next level. Good simple? Not when the ball gets smaller and smaller. A ball is never allowed to miss your active screen unless you're a true master! **16K IC1 £9.95**

**MOVING MAZE** MOVING MAZE employs the game paddles to direct a puck from one side of a maze to the other. However, the maze is dynamically (and randomly) built and is continually being modified. The objective is to escape the randomly built and is continually being modified. The objective is to escape the maze without touching the bomb or by a wall. Scoring is by the speed of the indicator and three levels of play are provided. **16K IC1 £9.95**

**ALPHA LIGHTER** Two excellent graphics and action programs it is. ALPHA LIGHTER requires you to destroy the alien asteroids passing through your sector of the galaxy. ALPHA BASE is on the path of its alien UFO's, let five UFO's get by and the game ends. Both games require the joystick and get progressively more difficult the higher you score. ALPHA LIGHTER will run on a 16K system. **24K IC1 P11 95**

**THE WINGS OF THE EMPIRE** This Empire has developed a new battle station protected by rotating radar of energy. Each time you blast through the rings and destroy the station, this empire develops a new station with more protective rings. The scrolling game runs on 16K systems, employs extensive graphics and sound and can be played by one or two players. **16K IC1 £29.95**

## SANTA CRUZ/TRICKY TUTORIALS

**DISPLAY LIGHTS** Teaches you how to enter the action format of small and large text as the screen together and high and low res graphics. **16K IC1 P13 95**

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**THE GRAPHICS MACHINE** Type simple commands like line, box, circle, polygon, fill and even screen to get lines, polygons, box, circle and retrieve it seconds. Several demos are included in this great program. **40K IC1 £19.95**

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## ARCADE PLUS

**GHOST HUNTER** Find the monster as Hackberry Hill of Ghosts. An exciting fast action arcade type game using excellent sound and graphics. **16K IC1 £19.95**

## SPECTRUM

**GALACTIC CHASE** A fast action arcade type game employing 16K color graphics. Wave after wave of a lurking alien must be destroyed in this Galaxian type game. The display is excellent. **16K IC1 P13 95**

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# GO TO WORK ON THE ZX81

Go is in essence very simple. It comes as no surprise therefore that the basics of the game are easy to program.

The short ZX81 BASIC program shown allows you to use your T.V. screen as a Go board. The program is no advance on the traditional board. It is merely a starting point for better things to come!

The most obvious extension is to add in the rules of play. A major element, capture, takes place when stones are closely surrounded by the opposing force. Wouldn't it be nice if we could make the program remove captured stones automatically?

At first sight this seems straightforward enough — the program must check that a single stone or a group — adjacent stones of the same colour — has no further liberties — adjacent vacant points. But as with many programming exercises, there are logic traps just waiting for the unwary!

First, we must consider more than one group, each independently. In fact up to four groups can, in theory, be captured by a single move. This extreme case is shown in the first two diagrams.

A second tricky problem is how to get the program to identify all the stones of a group without missing any. Then it's even trickier to get the program to recognise when it can stop looking!

The best solutions are often the simplest. Only if the program proves slow in practice need it be "polished". One simple method of detecting a group relies on copying that group on to an entirely fresh array — call it the "capture" array — the same size as the board array.

The code for detecting a group should be written as a subroutine. Then it can be used for each potentially captured group

BY ALAN SCARFF

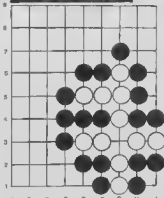


Fig 1

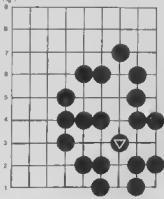


Fig 2

## DETECTIVE WORK...

The Detection Subroutine

**STEP 1** Clear the capture array. Put the stone which is nominated by the main routine, on the array.

**STEP 2** For the last stone placed on the capture array, examine its adjacent intersections on the board array in the order North, East, South and West. If any adjacent intersection is found to be vacant, exit from the subroutine with a "not captured" result. If any adjacent intersection is found to hold the same colour stone, i.e. it extends the group, then put this stone on the capture array and start STEP 2 afresh. If, however, neither a vacant intersection nor an extension to the group is found, proceed to the next step.

adjacent to the last stone played.

The subroutine can detect when it should stop and return to the main routine by using a repetitive process of "sweeping" its capture array. At each sweep it will either find another adjacent stone to extend the group, or it will not, in which case it can stop!

Having used the subroutine to detect a captured group, it can also be used to check if the last move has attempted to capture itself. Such a move is illegal. This can be indicated by generating a noise or whatever else you consider appropriate!

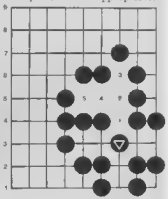


Fig 3

**STEP 3** Examine the adjacent intersection on the board array for each stone on the capture array. If a new stone of the same colour is found, put it on the capture array and go back to STEP 2. If after examining all the intersections, no new extension is found, return to the main routine with a "captured" result.

Figure 3 shows the order of detection of the stones in one of the captured groups. STEP 1 puts stone 1 on the capture array. STEP 2 places stones 2 and 3. STEP 3 sweeps the capture array to find and place stone 4. STEP 2 then places stone 5. Finally STEP 3 fails to find a fresh extension to the group and so returns with the list of captured stones.

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# Adventure

## DIAMONDS AND CLAWS

Now that we have covered the basics of Adventure programming — pardon the pun! — we are ready to have a look at some of the intricate parts.

When you first started writing your game, no doubt the word SCORE seemed very remote from your problems. Nevertheless, most Adventure games have a SCORE feature, the score usually being based on the number of treasures deposited in a special treasure storage location.

Let us code a score feature awarding say 10 points per treasure deposited in location LT.

First it will be necessary for the treasures to be recognised and not confused with "ordinary" objects. If obvious descriptions like DIAMOND or GOLD BAR are used, the player is probably in little doubt, but the computer won't be terribly impressed.

Therefore, all treasures in the object array should be grouped together in a block, say from  $0\$(n)$  to  $0\$(n+m)$ . The command SCORE can then execute a routine like:

```
SC = 0 : REM SC is score - zero to start count
FOR I = (n) TO (n+m)
IF P(I) = LT THEN SC = SC + 10
NEXT
Q1$ = "You have scored"; SC :
GOTO (start)
```

If the treasure descriptions are less obvious, like AMBER CLAW, then even the player may be in doubt as to its value.

A way round this is to identify each treasure with a special symbol such as an asterisk or a diamond alongside its description, for example \*AMBER CLAW\*.

Thus, treasures no longer have to be grouped together in the array, although doing this will still help to reduce the scan of the object array. We can now have:

```
SC = 0
```

```
FOR I = 0 TO (n) : REM Object array has (n+1) elements
IF P(I) = LT AND LEFT$(O$(I),1) = "*" THEN SC = SC + 10
```

```
NEXT
```

```
Q1$ = "You have scored"; SC :
GOTO (start)
```

No doubt you are wondering if you will now have to type "\*DIAMOND\*" to reference a diamond that's a treasure. You don't, but I will explain the way round this next month.

A couple of points to beware of. The treasure stores will be frequently visited once discovered, and could well become a depository for all sorts of rubbish as well as treasures.

When this location is visited and the objects present are displayed, towards the end of the game the display variables may not have sufficient capacity to contain all the objects, or the amount of string space available for the concatenation of these objects may be insufficient.

This may result in truncation of the object/treasure list, or cause the program to "hang up" whilst the machine searches for free string space, possibly breaking with an Out of String Space error.

If the variables won't hold all the objects, establish more variables, then work on the string space problem — increase it by a hundred or so. This may now lead to an Out of Memory error, in which case revert to the working version of the string space, and restrict the number of objects that can be deposited at the location by limiting them to treasures only.

To do this you will need to modify the DROP routine to detect the asterisk, and if not found reply with a message like "SORRY, ONLY TREASURES MAY BE DROPPED HERE".

Meanwhile, to round off the SCORE routine, don't forget to bring the game to an end if all treasures are home, by following the NEXT line by:

```
IF SC = 100 THEN (clear screen):
PRINT
"Congratulations, you have won" : END
```

Scott Adams' adventures are always full of mystery and excitement, and have set something of a standard on the Micro Adventure scene. So it's about time we had a look at another of his works.

Savage Island, part one, is one of the most devious games that I have played. The object is not to collect treasures, but to obtain the password needed to commence part two. Who could resist buying the sequel after such a struggle?

At the outset, one finds oneself on a deserted beach on a tropical island. A stilt around reveals an impenetrable jungle, a plain, a shark infested ocean and an extinct volcano.

It all seems like a very routine exploration job. Even after working out how to keep at bay the bear who inhabits the cave at the top of the volcano — a problem that you will spend hours sweating over — things seem to be going quite well... except for the lingering sense of



unease after having examined the stone head back on the beach.

But it's easy to forget about that, trying to survive hurricanes and investigating bangs and bumps in the night.

Is the island all it seems? Where are those vital tools we became certain we needed some two months ago and still haven't found?

There is indeed something very sinister about, and it seems our old chertling friend from Pirate's Island is lurking around somewhere. So startling is the finale to this first part, that having been clever enough to get the password, I can't wait to find out what happens in part two.

Savage Island is published by Adventure International and versions are available for TRS 80, Video Genie, Apple, Exidy Sorcerer, and Atari computers.

## TIPS ON DONKEY KONG

### DON'T MONKEY AROUND WITH KING KONG!

King Kong certainly grossed plenty of money at the box office and now he's doing it again in the arcade.

The mammoth monkey is the star of Donkey Kong (also to be found under the name of Crazy Donkey) the arcade circuit's current money spinner.

There are four screens to this game which features an attempted rescue, by a cartoon character known as Jump Man, of a young lady in Kong's clutches.

For the beginner the game offers a rather confusing array of possible tactics.

The first screen shows Kong rolling barrels down a tilted array of girders, up which Jump Man must run to rescue his lady.

Points are scored for jumped over or hammer-squashed barrels, but these are not as significant as the time bonus given for reaching the top of the screen — so give that priority.

The hammer is a double-edged weapon, crushing barrels in the hands of a welder but liable to disappear at the most misfortunate moments and also preventing you from climbing.

Golden rules for this first wall known as, "Starway to the Stars".

### STREET TALK

Although the name of the game is Donkey Kong, human pervasivity dictates that the hairy gorilla throwing things down from the top of the screen, should be nicknamed "The Monkey".

Donkey Kong is a nch playground for people who like coming nick-named "Conveyor belts" is a pretty common term for the moving stairways which give the hero a lift to the top of the screen or shunt him unexpectedly sideways.

When the Jumpman goes on the rampage with the hammer, I have overheard the phrase "Give 'em some steel". And the big stairway in the third screen is

ais, don't wait beneath the edge of a girder — you can't jump a falling barrel — and try to use the right hand side of the screen — Kong drops things straight down on the left. Don't forget that you can always hide halfway up a ladder if in trouble.

The second screen seems more difficult but can be negotiated quickly for a big time bonus. Little fires and things which can best be described as pies, form Kong's main threats in this screen of conveyor belts. For a last time, run along the bottom of the screen to the right and go up to the first level.

Leap on the conveyor belt when there's a gap and you'll find yourself travelling along to the fire — fatal — but there is a ladder above you and that is the way to safety. If you miss, it is possible to move along the conveyor belt the wrong way by running jumps.

Up to the next level and some pie jumping needs to be done to get underneath the extending and contracting ladder. Wait until it extends to the top — and Kong is not too close — to make your break for home and a high bonus.

The third screen features lifts running up and down a central structure. Take the lift up to collect as many objects —

umbrellas, chickens and the like — as you dare then down and jump to the staircase. Watch the falling missiles until you are sure of their pattern. Make your dash beneath them as they move to their furthest point from you.

The final dash for home is a question of finding the safe spots beneath the bouncing projectiles. These are just above the penultimate ladder and one centimetre away from the final ladder. Strategic wits here will see you safely home.

The fourth wall can have no set strategy as it is very random. Eight coin-like plugs are the key features which must be collected. These have the added bonus of restricting the fire's movement. When all eight have been collected the screen has been conquered and they can be done in any order.

Use the hammer on this wall to squash the four fires on the middle level.

After this the game repeats but becomes faster and harder. Remember, the longer you take the faster the fires get and beginners should watch out for a good time bonus at the top right hand corner of the screen: 4,500 is reasonable, but some machines offer only 2,000 and prove very difficult.

## TIME TO TALK TURTLE

### TURPIN

Turpin is an everyday tale of pond survival with a sprinkling of Russian roulette thrown in as well.

The hero figure is a turtle whose mission is to see a six baby terrapins home to the turtle house.

There are eight mystery locations around the screen which make up a maze and the six baby terrapins are hidden away beneath these.

The catch is that two deadly Snapper turtles are also hiding out beneath these locations.

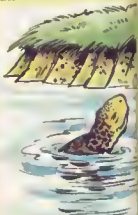
The Snappers' must be avoided which is easy at first as they roam the screen at random. But when they turn blue later they pursue the player.

The player can drop an egg bomb to stun a Snapper turtle but he only has three of these at the beginning of the game although three more are granted each time the player turtle crosses the centre star.

To win a new screen the player must deliver all six terrapins to the turtle house.

Turpin is a new maze-chase game which definitely should be placed in the "outs" category. Fine graphics on a deep-blue pond background and the Snappers look suitably vicious.

Points are scored for delivering a terrapin, 150, piggybacking a terrapin, 100, eluding a Snapper turtle, 80, and stunning a Snapper, 50 points. A bonus player turtle is awarded for over 5,000.



# DIG THESE CRAZY MONSTERS

When it seemed that maze games were in danger of turning up one of their own dead ends, a new innovation has emerged.

The do-it-yourself-maze game goes under the name of Dig-Dug and features a kind of super allotment where all the action takes place.

The hero is a gardener, who comes complete with his own spade and a healthy appetite for "greens".

The screen shows a cut-away

## DIG-DUG

view of the land and the player controls the gardener as he digs out a maze of tunnels.

His aim is to collect vegetables from within the ground and destroy any monsters that try to thwart him.

The monsters are a motley looking crew which seem to have come straight out of the darker recesses of the games

designers' imagination and live beneath the soil.

The only easily described creature is one which resembles a dragon — page 97 in the book of common garden pests.

They can be despatched by the gardener by dropping rocks on them or blasting them with his gun.

Points are scored for any monsters which our hero kills off and any tasty vegetables he consumes in the game.



Video games have ironically turned out to be a real shot in the arm for the pinball machines which once seemed in danger of losing out to the likes of space invaders.

The pinball designers, forced to become more innovative and imaginative to win back the players are now producing machines which put the ancient tumbly on the skill factors and give dedicated players a chance to build up high scores without relying heavily on the run of the ball.

One of the new breed of pinball games is Hyperball which could herald the start of a new category of arcade games.

It has the familiar pinball features of backboard, play-area targets and ball-bouncers — but thoro the similarity ends, for Hyperball is not about keeping balls in play.

Instead the player is given two triggers which take the place of the normal flippers and let him fire the ball bearings directly into playfield. It is a rapid fire theme that has already made Hyperball very popular in the U.S.

The playfield is dominated by an energy centre which is bombarded by spinning energy bolts. The aim of the player is to hit targets and prevent the lightning bolts from striking home.

The balls come out at anything up to 250 a minute and good players will make full use of this speed to protect the energy centre. Bonus points are offered for players who can hit targets which spell out words requested by the machine. One example is "energy" which must be spelt out in sequence by dropping balls through correct holes in the deck.

It is a fast action game which rewards skill—but it is difficult.



# THE MEAN MACHINES ARE HERE!

That ever-popular science fiction theme, the robots have taken over the asylum, has now been recreated story-book fashion in the arcade.

Robots, the story goes, fed up with mankind's inept attempts at running Earth, decide to take matters into their own steely mitts and, with a fan degree of death and destruction, set out to do just that in the new game Robotron.

As always in these tales, one man stands between the robots and total human oblivion — in Robotron, that man is you.

Armed with a robot-blastor, you are charged with the protection of your family. The robotic hordes come in all shapes and sizes. The early ones tend to be small and easily despatched, the later models are bigger and more dangerous.

Certain varieties cannot be killed but only stopped for a time, others have the ability to turn your family into mutants.

The machine tells you the

## ROBOTRON

story and how to play. The story expands to illustrate each new screen and describe the events.

The game is a cross between Berserk and Defender and you are represented on the screen by a human figure which is controlled by an eight way joystick.

Each screen is progressively

more difficult and by the third screen you have to deal with mutated family members.

Like Defender, the game comes from the Williams stable. It is due to be launched here at the end of May and is confidently expected to be a successor to the popular Defender.









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Continued from page 33

Then it's out of your hands and the two teams are up against one another with a running commentary of events. Keep a close check on which of your players seem to lose possession and play badly, these are the one's you will want to substitute. A good substitution will improve your play — a bad one will give the opposition more chance.

```

4930 PRINT " "
4930 PRINT "A(X:1) " "J1:" "J2:" " " "J2:"
4940 PRINT " "
4945 GOTO 9930
4950 RETURN
5000 REM INITIAL GROUP FIXTURES
5004 W=6
5005 C=1:J=12
5010 H2=1:R2=21:GOSUB 5020
5011 H2=3:R2=41:GOSUB 5020
5012 H2=1:R2=31:GOSUB 5020
5013 H2=21:R2=41:GOSUB 5020
5014 H2=1:R2=41:GOSUB 5020
5015 H2=21:R2=31:GOSUB 5020
5016 RETURN
5020 D1=D+1
5021 GOSUB 3410
5022 PRINT "B"
5024 PRINT "RESULTS FOR 'ID1:' JUNE '92"
5030 PRINT " "
5032 FOR I=1 TO 6
5033 W=I:R1=1:R2=1:R3=1:R4=1
5034 IF W=1 THEN B=1:GOTO 5035
5035 GOTO 7000
5035 PRINT "GROUP 'I1' " "A(X:1)B: " "A(R:1)C
5040 NEXT I
5041 IF D1=18 THEN GOSUB 7200
5042 PRINT " "
5043 IF D1=18 THEN RETURN
5044 PRINT "PRESS L TO DISPLAY LEAGUE TABLES"
5045 PRINT " ANY OTHER KEY TO CONTINUE"
5046 GET Z
5048 IF Z="L" THEN GOTO 5046
5049 IF Z="L" THEN GOSUB 7200
5050 RETURN
5100 REM PRINT GROUPS A-D
5102 PRINT "A"
5105 PRINT "GROUPS FOR THE SECOND STAGE ARE 1-4"
5107 PRINT " "
5110 FOR I=1 TO 2
5120 PRINT "GROUP " "I(R:(4+I)):T(R:20) " "GROUP " "I(R:(6+I))
5130 PRINT " "
5140 FOR J=1 TO 3
5150 PRINT "A(R:(2+I),J):T(R:20)A(R:(2+I),J)"
5160 NEXT J
5165 PRINT " "
5170 NEXT I
5180 RETURN
5200 REM SECOND STAGE FIXTURES
5205 W=4
5210 D1=27
5220 H2=1:R2=21:GOSUB 5300
5230 H2=3:R2=41:GOSUB 5300
5240 H2=21:R2=31:GOSUB 5300
5250 RETURN
5300 REM SECOND STAGE FIXTURES
5302 GOSUB 8310
5310 GOSUB 3410
5322 PRINT "B"
5324 PRINT "RESULTS FOR 'ID1:' JUNE '92"
5326 PRINT " "
5327 FOR I=1 TO 4
5329 W=I:R1=1:R2=1:R3=1:R4=1
5330 IF W=1 THEN B=1:GOTO 5335
5331 IF W=2 THEN B=1:GOTO 5335
5332 GOTO 7000
5335 PRINT "GROUP " "I(R:(4+I)):T(R:20) " "GROUP " "I(R:(6+I))
5340 NEXT I
5341 IF D1=29 THEN GOSUB 7200
5342 PRINT " "
5343 IF D1=29 THEN RETURN
5344 PRINT "PRESS L TO DISPLAY LEAGUE TABLES"
5345 PRINT " ANY OTHER KEY TO CONTINUE"
5346 GET Z
5348 IF Z="L" THEN GOTO 5346
5349 IF Z="L" THEN GOSUB 7200
5350 RETURN
5400 REM GENERATE TEAM TACTICS
5410 FOR I=1 TO 24
5412 S=C:R1=1:R2=1:R3=1:R4=1
5414 S=C:R1=1:R2=1:R3=1:R4=1
5416 S=C:R1=1:R2=1:R3=1:R4=1
5418 S=C:R1=1:R2=1:R3=1:R4=1
5420 S=C:R1=1:R2=1:R3=1:R4=1
5422 S=C:R1=1:R2=1:R3=1:R4=1
5424 S=C:R1=1:R2=1:R3=1:R4=1
5426 S=C:R1=1:R2=1:R3=1:R4=1
5428 S=C:R1=1:R2=1:R3=1:R4=1
5430 S=C:R1=1:R2=1:R3=1:R4=1
5432 S=C:R1=1:R2=1:R3=1:R4=1
5434 S=C:R1=1:R2=1:R3=1:R4=1
5436 S=C:R1=1:R2=1:R3=1:R4=1
5438 S=C:R1=1:R2=1:R3=1:R4=1
5440 S=C:R1=1:R2=1:R3=1:R4=1
5442 S=C:R1=1:R2=1:R3=1:R4=1
5444 S=C:R1=1:R2=1:R3=1:R4=1
5446 S=C:R1=1:R2=1:R3=1:R4=1
5448 S=C:R1=1:R2=1:R3=1:R4=1
5450 S=C:R1=1:R2=1:R3=1:R4=1
5452 S=C:R1=1:R2=1:R3=1:R4=1
5454 S=C:R1=1:R2=1:R3=1:R4=1
5456 S=C:R1=1:R2=1:R3=1:R4=1
5458 S=C:R1=1:R2=1:R3=1:R4=1
5460 S=C:R1=1:R2=1:R3=1:R4=1
5462 S=C:R1=1:R2=1:R3=1:R4=1
5464 S=C:R1=1:R2=1:R3=1:R4=1
5466 S=C:R1=1:R2=1:R3=1:R4=1
5468 S=C:R1=1:R2=1:R3=1:R4=1
5470 S=C:R1=1:R2=1:R3=1:R4=1
5472 S=C:R1=1:R2=1:R3=1:R4=1
5474 S=C:R1=1:R2=1:R3=1:R4=1
5476 S=C:R1=1:R2=1:R3=1:R4=1
5478 S=C:R1=1:R2=1:R3=1:R4=1
5480 S=C:R1=1:R2=1:R3=1:R4=1
5482 S=C:R1=1:R2=1:R3=1:R4=1
5484 S=C:R1=1:R2=1:R3=1:R4=1
5486 S=C:R1=1:R2=1:R3=1:R4=1
5488 S=C:R1=1:R2=1:R3=1:R4=1
5490 S=C:R1=1:R2=1:R3=1:R4=1
5492 S=C:R1=1:R2=1:R3=1:R4=1
5494 S=C:R1=1:R2=1:R3=1:R4=1
5496 S=C:R1=1:R2=1:R3=1:R4=1
5498 S=C:R1=1:R2=1:R3=1:R4=1
5500 S=C:R1=1:R2=1:R3=1:R4=1
5502 S=C:R1=1:R2=1:R3=1:R4=1
5504 S=C:R1=1:R2=1:R3=1:R4=1
5506 S=C:R1=1:R2=1:R3=1:R4=1
5508 S=C:R1=1:R2=1:R3=1:R4=1
5510 S=C:R1=1:R2=1:R3=1:R4=1
5512 S=C:R1=1:R2=1:R3=1:R4=1
5514 S=C:R1=1:R2=1:R3=1:R4=1
5516 S=C:R1=1:R2=1:R3=1:R4=1
5518 S=C:R1=1:R2=1:R3=1:R4=1
5520 S=C:R1=1:R2=1:R3=1:R4=1
5522 S=C:R1=1:R2=1:R3=1:R4=1
5524 S=C:R1=1:R2=1:R3=1:R4=1
5526 S=C:R1=1:R2=1:R3=1:R4=1
5528 S=C:R1=1:R2=1:R3=1:R4=1
5530 S=C:R1=1:R2=1:R3=1:R4=1
5532 S=C:R1=1:R2=1:R3=1:R4=1
5534 S=C:R1=1:R2=1:R3=1:R4=1
5536 S=C:R1=1:R2=1:R3=1:R4=1
5538 S=C:R1=1:R2=1:R3=1:R4=1
5540 S=C:R1=1:R2=1:R3=1:R4=1
5542 S=C:R1=1:R2=1:R3=1:R4=1
5544 S=C:R1=1:R2=1:R3=1:R4=1
5546 S=C:R1=1:R2=1:R3=1:R4=1
5548 S=C:R1=1:R2=1:R3=1:R4=1
5550 S=C:R1=1:R2=1:R3=1:R4=1
5552 S=C:R1=1:R2=1:R3=1:R4=1
5554 S=C:R1=1:R2=1:R3=1:R4=1
5556 S=C:R1=1:R2=1:R3=1:R4=1
5558 S=C:R1=1:R2=1:R3=1:R4=1
5560 S=C:R1=1:R2=1:R3=1:R4=1
5562 S=C:R1=1:R2=1:R3=1:R4=1
5564 S=C:R1=1:R2=1:R3=1:R4=1
5566 S=C:R1=1:R2=1:R3=1:R4=1
5568 S=C:R1=1:R2=1:R3=1:R4=1
5570 S=C:R1=1:R2=1:R3=1:R4=1
5572 S=C:R1=1:R2=1:R3=1:R4=1
5574 S=C:R1=1:R2=1:R3=1:R4=1
5576 S=C:R1=1:R2=1:R3=1:R4=1
5578 S=C:R1=1:R2=1:R3=1:R4=1
5580 S=C:R1=1:R2=1:R3=1:R4=1
5582 S=C:R1=1:R2=1:R3=1:R4=1
5584 S=C:R1=1:R2=1:R3=1:R4=1
5586 S=C:R1=1:R2=1:R3=1:R4=1
5588 S=C:R1=1:R2=1:R3=1:R4=1
5590 S=C:R1=1:R2=1:R3=1:R4=1
5592 S=C:R1=1:R2=1:R3=1:R4=1
5594 S=C:R1=1:R2=1:R3=1:R4=1
5596 S=C:R1=1:R2=1:R3=1:R4=1
5598 S=C:R1=1:R2=1:R3=1:R4=1
5600 S=C:R1=1:R2=1:R3=1:R4=1
5602 S=C:R1=1:R2=1:R3=1:R4=1
5604 S=C:R1=1:R2=1:R3=1:R4=1
5606 S=C:R1=1:R2=1:R3=1:R4=1
5608 S=C:R1=1:R2=1:R3=1:R4=1
5610 S=C:R1=1:R2=1:R3=1:R4=1
5612 S=C:R1=1:R2=1:R3=1:R4=1
5614 S=C:R1=1:R2=1:R3=1:R4=1
5616 S=C:R1=1:R2=1:R3=1:R4=1
5618 S=C:R1=1:R2=1:R3=1:R4=1
5620 S=C:R1=1:R2=1:R3=1:R4=1
5622 S=C:R1=1:R2=1:R3=1:R4=1
5624 S=C:R1=1:R2=1:R3=1:R4=1
5626 S=C:R1=1:R2=1:R3=1:R4=1
56
```





## ZX-81

**Q6 DEFENDER.**

UP - DOWN - THRUST - FIRE  
First and only full screen display  
Software to drive QS SOUND BD  
Moving Planetary surface Up to  
84 fast moving characters on  
screen at once On screen scoring  
Ten missiles at once Increasing  
attack patterns Requires 8K  
ROM, and 4K min of RAM **£5.50.**

**Q6 SOUND BD.**

A programmable sound effects  
board using the AY 3-8910 3  
TONES, 1 NOISE, ENVELOPE  
SHAPE. + TWO 8 BIT I/O PORTS  
Easily programmable from  
BASIC, the AY chip does most of  
the work leaving your computer  
free for other things Signal O/P  
via 3.5 mm jack socket Ports O/P  
via a 16 pin IC Socket **£25.00.**

**Q8 CHRS BD./**

A programmable character  
generator giving - 128 SEP.  
ARABICALLY PROGRAMMABLE  
CHARACTERS ON/OFF SWITCH  
1K ON BOARD RAM Enables  
creation and display of your own  
characters to screen or printer  
Demo cassette of fast machine  
code operation routines and lower  
case alphabet included. See below  
for ZX PRINTER listing **£25.00.**

**QS - LOWER CASE**

abcderfghijklmnopqrstuvwxyz

**Q8 INVADERS.**

LEFT - RIGHT - FIRE  
13x7 INVADERS, High score, 3  
levels of play, RND saucers, Bonus  
base, Driven Sound bd & CHRS bd.  
Requires 7K RAM, 8K ROM + Slow.  
**£5.50.**

**Q8 HI-RES BD.**

A Hi-res graphics board giving -  
256 x 192 PIXELS 6K ON BD  
RAM SOFTWARE SELECT/  
DESELECT MIXED TEXT AND  
GRAPHICS 2K ON BOARD ROM  
Resident fast machine code  
graphics software (in ROM)  
provides the following HI-RES  
Commands - MOVE x,y, PLOT x,  
y, DRAW x,y, BOX x,y, UP, DOWN,  
LEFT, RIGHT, PRINT A#, SCROLL,  
BLACK, WHITE CLEAR COPY See  
above for ZX PRINTER listings  
using COPY **£55.00.**

## ZX-80

**Q8 ASTEROIDS**

LEFT - RIGHT - THRUST - FIRE  
Software to drive QS SOUND BD  
Multiple missiles firing in 8  
directions On screen scoring  
Increasing number of asteroids  
Full mobility of ship to all areas of  
the screen. Two asteroid sizes  
Bonus ship at 10,000 points  
Requires 8K ROM, 4K min of RAM  
+ SLOW function **£5.50.**

**Q8 32K RAM BD.**

An extremely reliable static RAM  
Bd. which combines with the  
computer's memory to give 4K  
total. Plugs direct in to the rear  
port on your ZX Computer  
**£15.00.**

**Q5 MOTHER BOARD BD. & Q5 CONNECTOR.**

A reliable expansion system  
allowing a total of any RAM pack  
plus two other plug in boards to be  
in use at once On board 5V  
regulator drives all external  
boards Fitted with two 25 way  
double sided edge connectors.  
Connector is 2x25 way edge  
connectors soldered back to back  
Expansion can operate in two  
ways - (1) COMPUTER --  
CONNECTOR -- Any Q5 add on bd  
(but no extra RAM pack) (2)  
COMPUTER -- CONNECTOR --  
MOTHER BD -- ANY RAM PACK  
(2 bds to fit in mother bd.) Mother  
board **£12.00** Connector **£4.00.**

**Special offers & news**

(1) Q5 Mother bd. + connector + CHRS bd. + The special Graphics version of  
**ANTIC COMPUTING'S ZX CHRS 11. £45.00.**

The strongest chess program with 7 levels of play

(2) Q5 MOTHER BD + CONNECTOR + either SOUND or CHRS bd **£40.00.**

We will be at the following shows Come and see us

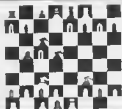
**THE COMPUTER FAIR, Earls Court, 23rd to 25th April**  
**3rd ZX MICROFAIR, Central Hall, Westminster.**  
**30th April & 1st May**

POSTAL AND MONEY ORDERS TO:

**QUICKSILVA, 95, UPPER BROWNHILL RD., MAYBUSH, SOTON, RANTS, ENGLAND.**

Please state Type of machine, Which ROM, Memory size, when ordering.

ALL PRODUCTS FULLY GUARANTEED.









```

9950 IF @I>1 THEN RETURN
9960 22=2
9970 RETURN
9980 PRINT "PRESS ANY KEY TO CONTINUE"
9990 GET "C"
9910 IF "C"="" THEN 9905
9920 RETURN
9930 FOR I=1 TO 1200
9940 NEXT I
9950 RETURN
9960 REM INPUT NUMBER FROM 1 TO 3
9970 INPUT "ENTER A NUMBER BETWEEN 1 AND 3" IE$
9980 IF LEN(IE$)=1 THEN 9990
9990 IF ASC(IE$)<49 THEN 9990
9960 IF ASC(IE$)>59 THEN 9990
9960 E=VAL(IE$)
9970 RETURN
9980 PRINT "PLEASE RE-ENTER"
9990 GOTO 9960
10000 FOR I=1 TO 24
10010 F=1+INT(RND(1)*3)+1
10020 NEXT I
10030 RETURN
10040 FOR I=1 TO 14
10050 READ A$(I)
10060 NEXT I
10070 RETURN
10080 FOR I=1 TO 3
10090 FOR J=1 TO 3
10100 READ A(I,J):READ A(I,J)
10110 NEXT J
10120 NEXT I
10130 RETURN
10140 FOR I=1 TO 20
10150 READ T$(I)
10160 NEXT I
10170 RETURN
10180 REM GENERATE TERM'S RATINGS
10190 FOR I=1 TO 3

```

Longer listings are best! That's the message you keep drumming into us on the telephone and by letter. Well, they don't come much longer than World Cup Manager and we hope you take the trouble to say it in. But for any Sharp owners who feel it will be too risky or lame consuming to type it, a cassette of the game is available from Sharpsoft. It costs £5.75 and can be bought from Sharpsoft, 86/99 Paul Street, London EC1.

```

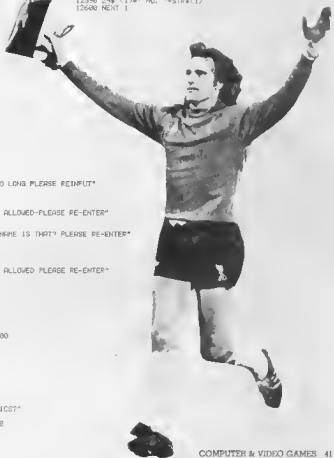
12605 29#(J$)=" THE IR GORKKEEPER "
12610 RETURN
12615 PERM GENERATE GORKSCORING MESSAGES
12620 FOR I=1 TO 9
12630 READ R1$(I)
12635 NEXT I
12640 FOR I=1 TO 9
12650 PERM R2$(I)
12660 NEXT I
12670 RETURN
14000 REM CHECK VALIDITY OF NAME
14005 K3=6
14010 INPUT D$;INPUT R$;I
14020 IF LEN(R$) > 32 THEN PRINT "NAME IS TOO LONG PLEASE RE-INPUT"
14030 IF LEN(R$) < 3 THEN PRINT "NAME IS TOO SHORT PLEASE RE-INPUT"
14040 FOR K1=1 TO LEN(R$)-1
14050 K2=ASC(MID$(R$,K1,1))-1
14060 IF K2=90 THEN PRINT "ONLY LETTERS ARE ALLOWED-PLEASE RE-ENTER"
14070 IF K2=55 THEN GOTO 14010
14080 IF K2=52 THEN GOTO 14110
14082 IF K2<35-90 THEN PRINT "WHAT SORT OF NAME IS THAT? PLEASE RE-ENTER"
14090 K2=K2-35 THEN GOTO 14010
14095 IF K2=59 THEN GOTO 14110
14098 IF K2=45 THEN GOTO 14110
14099 IF K2=46 THEN GOTO 14110
14099 IF K2=47 THEN GOTO 14110
14100 IF K2=65 THEN PRINT "ONLY LETTERS ARE ALLOWED PLEASE RE-ENTER"
14110 K3=K2
14110 K3=K2
14115 NEXT K1
14120 NEXT I
15000 IF LEN(J$)=39 THEN PRINT "J"
15005 IF LEN(J$)<39 THENPRINT "J"
15010 IF LEN(J$)>39 THEN RETURN
15020 FOR J=39 TO 1 STEP-1
15030 IF ASC(MID$(J$,J,1))=32 THEN GOTO 16000
15040 NEXT J
15050 PRINT J$
15060 RETURN
16000 PRINTLEFT$(J$,J)
16010 J$=RIGHT$(J$,LEN(J$)-J)
16020 GOTO 15000
18000 PRINT " "
18010 PRINT"HALFTIME SCORE:"
18020 PRINT A$(T1)+B$( " ")+C$(2)+C
18030 PRINT"DO YOU WANT TO CHANGE YOUR TACTICS?"
18040 INPUT Z$
18045 IF ASC(LEFT$(Z$,1))=39 THEN GOSUB 8670
18050 GOSUB 8640
18055 RETURN

```

```

12120 R(1)=INT(RND(1)*10)+21
12130 NEXT I
12140 FOR I=1 TO 11
12150 R(1)=INT(RND(1)*10)+16
12160 NEXT I
12170 FOR I=12 TO 14
12180 R(1)=20
12190 NEXT I
12200 FOR I=15 TO 17
12210 R(1)=INT(RND(1)*5)+16
12220 NEXT I
12230 FOR I=18 TO 23
12240 R(1)=INT(RND(1)*5)+11
12250 NEXT I
12260 P(24)=INT(RND(1)*22)+11
12270 RETURN
12300 REM MATRIX OF MIDFIELD POSB.
12310 FOR I=1 TO 3
12320 FOR J=1 TO 3
12330 T(1,I,J)=10
12340 NEXT J
12350 NEXT I
12360 T(1,1,3)=5
12370 T(1,3,3)=15
12380 REM MATRIX OF FREEKICK TACTICS
12390 FOR I=1 TO 3
12400 FOR J=1 TO 3
12410 R(2,I,1)=J
12420 NEXT J
12430 NEXT I
12440 REM MATRIX OF CORNER TACTICS
12450 FOR I=1 TO 3
12460 FOR J=1 TO 3
12470 R(2,I,J)=J
12480 NEXT J
12490 NEXT I
12500 REM MATRIX OF ATTACK TACTICS
12510 FOR I=1 TO 3
12520 FOR J=1 TO 3
12530 R(2,I,J)=J
12540 NEXT J
12550 NEXT I
12560 REM GENERATE OPPOSITION DEFAULT NAMES
12580 FOR I=1 TO 12
12590 N$(I)=NM$(I)*ND$(I)*STR$(1)
12600 NEXT I

```



# TROLLS GOLD

A KING'S ransom in gold could be yours if you are willing to brave the terrors of a deep dark cave. But reaching the gold is only half the battle — there is a particularly nasty Troll guarding the gold. He will attempt to stop you taking his golden treasure out of the cavernous labyrinth — that's if he hasn't got to you as you find your way into his lair. There are 36 rooms where the Troll can lurk or where the gold may be found. Can you beat the Troll in this battle of wits?

## RUNS ON AN APPLE IN 3K

BY GEORGE BLANK

```

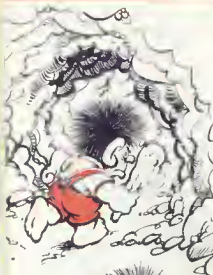
5  DIM A(110)
6  TEXT
7  HOME
10 REM # TROLLS GOLD #
30 GOSUB 4000
50 G = 0:P = 1:T = 36
60 HOME
80 GOSUB 2000
90 GOTO 1000
100 REM # DRAW GRID #
110 GR : COLOR= 15: MLIN 4,36 AT
    0
120 FOR I = 6 TO 36 STEP 6: MLIN
    1,36 AT 1: NEXT I
130 FOR I = 1 TO 37 STEP 6: VLIN
    0,36 AT 1: NEXT
290 COLOR= 5: PLOT 2,3

```

```

1 PLOT 3,3: PLOT 3,4: PLOT 4
,4: PLOT 4,5: PLOT 5,5
320 COLOR= 13: MLIN 32,34 AT 35:
    PLOT 33,34
410 GOSUB 5000
420 GOSUB 5200
490 RETURN
1000 REM # MASTER ROUTINE #
1010 IF SCRN( 2,2) < > 5 THEN
    GOSUB 100
1020 GOSUB 2700
1100 GOSUB 5500
1200 GOSUB 3300
1910 GOSUB 2800
1990 GOTO 1000
2000 REM # DOORS #
2010 FOR A = 1 TO 110
2020 A(A) = 0
2030 NEXT
2040 FOR A = 7 TO 34
2050 A(A) = 1
2060 NEXT
2070 FOR A = 52 TO 56
2080 A(A) = 1
2090 A(A + 6) = 1
2100 A(A + 12) = 1
2110 A(A + 18) = 1
2120 A(A + 24) = 1
2130 A(A + 30) = 1
2140 NEXT
2150 RETURN
2200 AEN # Y COORD OF DOOR # IN
    0 # OUT. Y #
2210 IF D > 49 THEN GOTO 2280
2220 IF D < 13 THEN Y = 4: GOTO
    2390
2230 IF D < 19 THEN Y = 12: GOTO
    2390
2240 IF D < 25 THEN Y = 18: GOTO
    2390
2250 IF D < 31 THEN Y = 24: GOTO
    2390
2260 IF D > 36 THEN Y = 36: GOTO
    2390

```



```

2270 Y = 30: GOTO 2390
2280 IF B < 57 THEN Y = 5: GOTO
2390
2290 IF D < 63 THEN Y = 11: GOTO
2390
2300 IF B < 69 THEN Y = 17: GOTO
2390
2310 IF O < 75 THEN Y = 23: GOTO
2390
2320 IF O < 81 THEN Y = 29: GOTO
2390
2330 Y = 35
2390 RETURN
2400 REM # X COORD OF DOOR # IN
, O # OUT, X #
2410 Z = 0
2420 IF Z > 49 THEN 2530
2430 Z = Z + 6
2440 IF Z > 6 THEN 2430
2450 Z = INT (Z / 2)
2460 IF Z = 1 THEN I = 4
2470 IF Z = 2 THEN I = 10
2480 IF Z = 3 THEN I = 16
2490 IF Z = 4 THEN I = 22
2500 IF Z = 5 THEN I = 28
2510 IF Z = 6 THEN I = 34
2520 GOTO 2590
2530 Z = D - 44
2540 Z = Z - 6
2550 IF Z > 6 THEN 2540
2560 Z = INT (Z / 2)
2570 IF Z = 2 THEN I = 7
2580 IF Z = 3 THEN I = 13
2590 IF Z = 4 THEN I = 19
2600 IF Z = 5 THEN I = 25
2610 IF Z = 6 THEN I = 31
2620 RETURN
2600 REM # SELECT ODDS #
2610 O = INT ((RND (1) * 80) +
7)
2620 IF A(O) < > I THEN 2610
2630 A(D) = 2
2640 GOSUB 2200

```

```

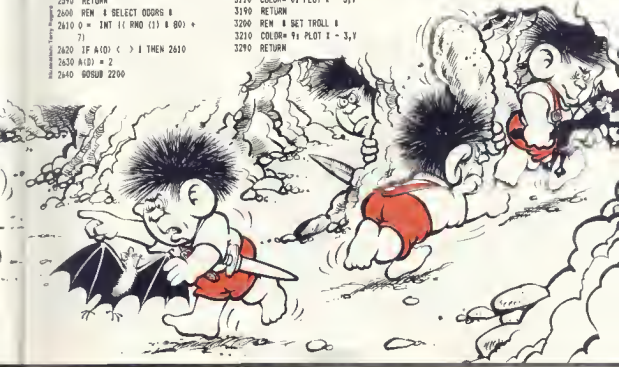
2650 GOSUB 2400
2690 RETURN
2700 REM # WHICH DOORS ARE OPEN
? #
2710 FOR B = 90 TO 110
2720 GOSUB 2600
2730 A(B) = 0
2740 COLOR = D: PLOT X,Y
2750 IF O > 40 THEN PLOT X,Y -
1
2760 NEXT B
2770 HOME
2790 RETURN
2800 REM # CLOSE DOORS #
2810 FOR A = 90 TO 110
2820 O = A(A)
2830 A(A) = 0
2840 A(D) = 1
2850 GOSUB 2200
2860 GOSUB 2400
2862 COLOR = 15
2865 IF D > 40 THEN 2880
2870 COLOR = 15: HLIN X - 1, X + 1
AT Y
2875 GOTO 2890
2880 VLIN Y, Y - 1 AT X
2890 NEXT A
2895 RETURN
3000 REM # LOCATE TROLL #
3010 O = T + 6
3020 GOSUB 2200
3030 GOSUB 2400
3040 X = X + 3
3050 Y = Y - 3
3060 RETURN
3100 REM # RESET TROLL #
3110 COLOR = 0: PLOT X - 3, Y
3190 RETURN
3200 REM # SET TROLL #
3210 COLOR = 9: PLOT X - 3, Y
3290 RETURN

```

```

3300 REM # CONTROL TROLL #
3310 GOSUB 3000
3320 GOSUB 3100
3330 C = T - P
3340 IF C < 0 THEN 3370
3360 GOTO 3400
3370 C = ABS (C)
3380 IF C < 6 THEN 3600
3390 GOTO 3700
3400 REM # MOVE TROLL UP #
3410 IF T < 7 THEN 3500
3420 IF A(T) = 2 THEN T = T - 6
3430 IF T = P THEN 4000
3500 REM # MOVE TROLL OUT #
3510 IF T = 1 THEN 3600
3520 IF A(T + 30) = 2 THEN T = T
- 1
3530 IF T = P THEN 4000
3540 IF A(T) = 2 THEN T = T - 6
3550 GOTO 3800
3600 REM # MOVE TROLL IN #
3610 IF A(T + 51) = 2 THEN T = T
+ 1: GOTO 3730
3700 REM # MOVE TROLL DOWN #
3710 IF T > 30 THEN 3800
3730 IF T = P THEN 4000
3740 IF A(T + 6) = 2 THEN T = T +
6
3800 REM # END TROLL TURN #
3810 IF T = P THEN 4000
3820 GOSUB 3000
3830 GOSUB 3200
3890 RETURN
4000 REM # EATEN BY TROLL #
4001 FOR I = 1 TO 10: PRINT CHR#
(17): NEXT I: GOSUB 3000

```



```

4002 GOSUB 3200
4003 FOR I = 1 TO 1000: NEXT
4005 TEXT : MOHE : VTAB 10
4010 TEXT : VTAB 10: INVERSE : FLRSH
      : PRINT "SOME PEOPLE NEVER L
      : EARN!!"
4030 NORMAL : PRINT
4040 PRINT "THE GIGR AT THE ENTR
      : ANCE TO THE CAVE BR10:"
4050 INVERSE : PRINT "P PLEGE
      : DON'T FEED THE TROLL " : NORMAL
4060 PRINT
4070 PRINT "THE TROLL JUST RTE Y
      : OU FOR DINNER!"
4000 PRINT
4090 PRINT " &&& YOU L O
      : G E ! &&&"
4100 PRINT
4110 INPUT "WOULD YOU LIKE TO TR
      : Y AGAIN?" : BB
4120 IF LEFT$ (BB,1) = "N" THEN
      : NORMAL : EQO
4125 GOTO 50
4500 REN & GAME WGN &
4510 TEXT : MOHE
4520 VTAB 10
4530 PRINT "&&&& YOU R
      : I N &&&&"
4540 PRINT
4550 PRINT " YOU ARE VERY RICH!!
      : !!!!!!!!"
4560 PRINT
4570 FOR R = 1 TO 1000: NEXT
4580 PRINT CHR$ (7) : PRINT "BY
      : THE WAY...."
4590 PRINT
4600 FOR R = 1 TO 1000: NEXT
4610 PRINT "CAN YOU LOAN ME A FE
      : H THOUSAND?"
4620 FOR R = 1 TO 1000: NEXT
4630 PRINT
4640 GOTO 4110
5000 REN & PLAYER LOCATION &

```

```

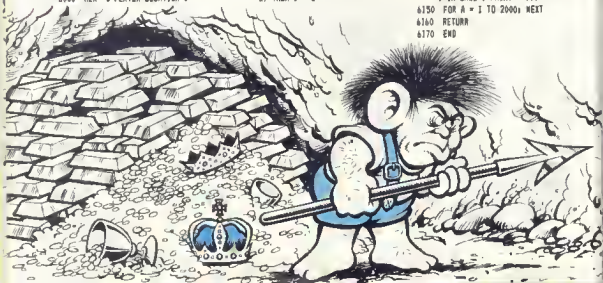
5010 O = P + 6
5020 GOSUB 2200
5030 GOSUB 2400
5040 I = X + 3
5050 Y = Y - 3
5090 RETURN
5100 REN & RESET PLAYER &
5110 COLOR= 0: PLOT X - 3,Y
5140 IF B = 1 THEN COLOR= 0: HLIN
      : X - 5,X - 2 RT Y + 2: HLIN X
      : - 4,X - 3 RT Y + 1
5190 RETURN
5200 REN & SET PLAYER &
5210 COLOR= 12: PLOT X - 3,Y
5240 IF B = 1 THEN COLOR= 13: HLIN
      : X - 5,X - 3 RT Y + 2: PLOT X
      : - 4,Y + 1
5290 RETURN
5300 REN & CONTROL PHASE &
5305 IF (A(P) < 2) & (R(P + 6) <
      : 2) & (R(P + 50) < 2) & (R(P +
      : 5)) < 2) THEN 5490
5310 INPUT "UP, DOWN, RIGHT (OR
      : IN), LEFT (OR OUT), OR BTRY
      : ?" : QB: E = QB: E = LEFT$ (QB,
      : 1): IF EQ = "U" THEN E = -
      : 6
5315 IF EQ = "D" THEN E = 6
5320 IF EQ = "R" OR EQ = "J" THEN
      : E = 1
5325 IF EQ = "L" OR EQ = "O" THEN
      : E = - 1
5330 J = 0: MOHE
5340 IF (E < 0) AND (P = 1) AND
      : (B = 1) THEN 4500
5350 IF (E = - 6) & (A(P) = 2) THEN
      : J = E
5360 IF (E = 6) & (A(P + 6) = 2)
      : THEN J = E
5370 IF (E = 1) & (R(P + 5)) = 2
      : THEN J = E
5380 IF (E = - 1) & (R(P + 50) =
      : 2) THEN J = E

```

```

5390 IF J = 0 THEN 5490
5400 GOSUB 3000
5410 GOSUB 5100
5420 P = P + J
5430 IF P = 36 THEN 5500
5440 GOSUB 5000
5450 GOSUB 5200
5460 IF T = P THEN 4000
5470 GOTO 5300
5490 RETURN
5500 REN & TAKE GOLD &
5510 GOSUB 5000
5520 G = 1
5530 GOSUB 5200
5540 GOSUB 5700
5550 GOTO 5300
5700 REN & RESET GOLD &
5710 COLOR= 0: HLIN X - 5,X - 3 RT
      : Y + 2: HLIN X - 4,X - 3 RT Y
      : + 1
5795 RETURN
6000 TEXT
6010 PRINT
6020 PRINT CHR$ (7)
6030 PRINT "TROLLS GOLO"
6040 PRINT
6050 PRINT "IF YOU ARE FOOLHARDY
      : ENOUGH TO"
6060 PRINT "DESCEND TO THE LOWER
      : T AND IMMOST"
6070 PRINT "REACHED OF A CAVE IN
      : HABITEO"
6080 PRINT "BY A HAGY TROLL, J
      : UST TO"
6090 PRINT "BTEAL HIB GOLO..."
6100 PRINT
6110 INPUT "PREGO RETURN": AB
6120 MOHE
6130 PRINT : PRINT CHR$ (7)
6140 VTAB 10: INVERSE : PRINT "P
      : P : FLASH : PRINT "PLEASE
      : DON'T FEED THE TROLL": NORMAL
      : : INVERSE : PRINT " &&&"
6150 FOR A = 1 TO 2000: NEXT
6160 RETURN
6170 END

```



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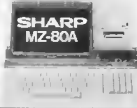
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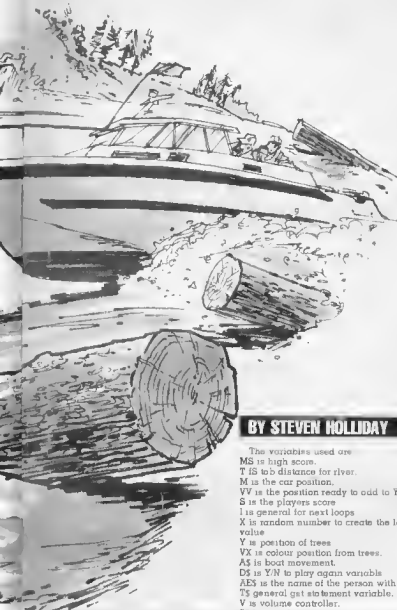
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```

0 MS=0:POKE36878,0:POKE36879,172
1 GOSUB5000
2 B=2:POKE36879,218:GOSUB7000
5 PRINT" "
10 PRINT"J".T=7:M=T+3:VV=0:S=0
20 FORI=1TO23
30 PRINTTAB(T)" "
40 NEXTI
50 X=INT(RND(1)*11)
55 Y=INT(RND(1)*23)
60 IFX<3TNENT=T-1
70 IFX<7TNENT=T+1
71 IFS>3500TNEN GOSUB 9000:GOTO90
72 IFS>2500THEN GOSUB8000:GOTO90
73 IFX=5THENPRINTTAB(T)" 6 "
74 IFX=10TNENPRINTTAB(T)" 3 "
75 IF1<TNENT=T-1
76 IF1>TNENT=T+1
70 IFX=7 TNENPRINTTAB(T)" "
80 VV=7600+(22*20)
01 VX=38400+(22*20)
02 IFV<TNENPOKEVV+Y,01:POKEVV+Y,5:POKEVV+22+Y,93:POKEVV+22+Y,2
03 IFV>T+9TNENPOKEVV+Y,01:POKEVV+Y,5:POKEVV+Y+22,93:POKEVV+22+Y,2
05 PRINTTAB(T)" "
90 GETA$
100 IFA$="0"TNENM=M-1
110 IFA$="1"TNENM=M+1
120 IFPEEK(M+7680)=101TNEN300
130 IFPEEK(M+7680)=103TNEN300
132 IFPEEK(M+7680)=102+128THEN300
135 IFPEEK(7680+M)=54+128THENS=S+6:FORI=1TO4:POKE36875,221+I:NEXTI:POKE36875,0
137 IFPEEK(7680+M)=51+128 TNENS=S+3:FORI=1TO4:POKE36875,120+I:NEXTI:POKE36875,0
140 POKEM+7600,42
145 FORI=1TO2:POKE36874,200+I:NEXTI
150 S=S+3
160 GOTO50
300 POKE36874,0
305 FORI=228TO127STEP-1
310 POKE7600+M,170
320 POKE7680+M,163
330 POKE7680+M,205
340 POKE7680+M,206
350 POKE7680+M,42
355 POKE36877,1
360 NEXT
365 POKE36877,0
367 POKE36876,127
368 B=-1:GOSUB7000
369 POKE36879,26
370 PRINT"JIN SPEED BOAT:_____"
380 PRINT"YOU SCORED:_____"
390 PRINTS:"POINTS"
395 IFS>MS THENVV=0:MS=S:GOTO1000
397 GOTO1060
400 PRINT"XXXXXXXXXX/N TO PLAY AGAIN "
410 FORI=1TO500:GETD$:IFD$="N"ORD$="N"TNENNEXTI
420 IFD$="Y"THENB=1:POKE36879,218:GOSUB7000:PRINT" ":GOTO10
425 IFD$="N"THENPRINT"XXXXXXXXXXBYE...BYE..." END
430 NEXTI
440 FORV=1TO50
450 PRINT" "
460 PRINT"Y/N TO PLAY AGAIN "
470 NEXTV
480 PRINT"IIIIIIY"
490 GOTO400
1000 REM
1010 PRINT"MS=S"
1020 PRINT"YOU HAVE GOT THE HIGH"
1030 PRINT"SCORE FOR TODAY"
1040 PRINT"PLEASE INPUT YOUR NAME"

```

# S·P·E·E·D·B·O·A·T



FINDING the source of the Mackenzie River by speedboat can be a real challenge in the logging season.

A lot of lumbering is going on and the thoughtless treefellers are sending their timber down river with little regard to life and limb.

The Mackenzie River follows the usual watery logic, being slow and sluggish at first but speeding up as you approach its source and after a score of 2,500 has been reached it narrows, becoming faster and more difficult for would-be discoverers to negotiate. Another 1,000 points and it is still more difficult.

A good boatsman will spot the most favourable currents and steer for them. These are shown as bonus points on the river.

The game is simple but it will suit the dexterous and those who can look ahead. It is for one person to steer the boat up-river, trying to miss the logs and hit the bonus scores as they flash upon the screen. To steer the boat use the two cursor keys for left and right.

The program runs as fast as it does because the river is printed onto the screen in a fast working statement and as the boat is poked onto the very top of the screen, each print statement pushes it totally off the screen, so only one poke statement is needed.

A graphically exciting and neatly playable game, difficult enough to become addictive.

## BY STEVEN HOLLIDAY

The variables used are

MS is high score.

T is tab distance for river.

M is the car position.

VV is the position ready to add to Y to create the trees.

S is the players score

I is general for next loops

X is random number to create the logs' numbers and tab value

Y is position of trees

VX is colour position from trees.

AS is boat movement.

DS is Y/N to play again variable

AES is the name of the person with the high score.

TS general get statement variable.

V is volume controller.

S2 is sound generator.

## RUNS ON A VIC-20 IN 3K

50-160 is main body of program.

7000-8000 is music routine.

5000-6000 the instructions.

8000-9000 is the medium width river.

9000- is thin river.

6000-7000 is data for music.

1000-2000 is high score routine

160-1000 prints score and asks if another go is required.

82&83 makes the trees grow.

120-137 checks next position of craft.



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```

1050 INPUTA$
1060 PRINTA$," HAS THE HIGH SCORE"
1070 PRINT"WITH";MS;"POINTS"
1080 GOTO400
3025 S=S+3
3095 POKE36875,0
5000 FORI=38 TO180:POKE36881,I:NEXTI PRINT"3"
5010 PRINT"200" SPEED BOAT
5020 PRINT"0000"
5030 REM SPEED BOAT.(V2 BASIC)
5040 REM BY S.L.HOLLIDAY
5050 REM 28/1/1982(FORV&CG)
5060 PRINT"*****ANY KEY TO CONTINUE"
5070 FORI=100 TO38 STEP-1:POKE36881,I:NEXTI
5080 GETT$ IFT$=""THEN5090
5090 FORI=38 TO180 POKE36881,I:NEXTI
5100 PRINT"00"
5110 PRINT"THE INSTRUCTIONS"
5120 PRINT"
5130 PRINT"0"
5140 PRINT"CRSR RIGHT=BOAT RIGHT"
5150 PRINT"CRSR DOWN=BOAT LEFT"
5160 PRINT"NUMBERS=POINTS(EXTRA)"
5170 PRINT"G-O-O-D L-U-C-K"
5171 PRINT"BEWARE!!"
5172 PRINT"ALOT OF LUMBERING IS"
5173 PRINT"TAIKING PLACE,SO"
5174 PRINT"WATCH OUT FOR THE LOGS"
5175 PRINT"IF YOU GO TOO FAR THE"
5176 PRINT"RIVER BECOMES A STREAM"
5180 PRINT"ANY KEY TO PLAY"
5185 FORI=100 TO38 STEP-1 POKE36881,I:NEXTI
5190 GETT$ IFT$=""THEN5190
5200 FORI=12 TO100 POKE36880,I:NEXTI PRINT"7" POKE36875,0
5210 FORI=100 TO12 STEP-1 POKE36880,I:NEXTI POKE36879,218 RETURN
6000 DATA225,260,225,360,225,240
6010 DATA228,120,231,360,231,240
6020 DATA228,120,231,240,232,120
6030 DATA235,720,240,360,235,360
6040 DATA231,360,225,360,235,240
6050 DATA232,120,231,240,228,120
6060 DATA225,480
6070 DATA -1
6080 DATA 195,000,0.80,195,600,0.80,195,200,195,800,0.80
6090 DATA203,600,201,200,0.80,201,600,195,200,0.80
6100 DATA195,600,0.80,195,200,0.80,195,1000,-1
7000 S2=36875
7001 IFB>0THENRESTORE
7010 V=36878
7020 REM
7030 POKEV,15
7040 READP
7050 IFF=1THENB=-1 RETURN
7060 READD
7070 POKE$2,P
7080 FORN=1TOD NEXTN
7090 POKE$2,0
7100 FOPH=1TOD20 NEXTN
7120 GOTO7040
8000 IF14<TTHEM=T-1
8010 IF1>TTHEM=T+1
8020 PRINTAB<T)" S=S+6
8030 RETURN
9000 IF18<TTHEM=T-1
9001 IF1>TTHEM=T+1
9005 PRINTAB<T)" S=S+12
9010 RETURN

```

# SAVE THE PRINCESS

**B**AD Baron Megabyte has imprisoned the beautiful Princess Minnie on the top floor of his nine storey castle. She is guarded by his minions who have orders to trample any intruder to death.

Armed with your magic crossbow, you, the brave knight Gothur Lothur Bother, have to find the keys to release her and then guide her to safety for a fairytale ending. You will find one key hidden on each of the lower nine floors of the castle. On each floor there are four hiding places. One of these contains a key, two are empty, and the last one could be empty or contain a sleeping enemy — who will not like being woken up.

Obstructions to your quest are scattered around the castle, but you can blast your way to safety or kill an enemy with one of your nine magic crossbow bolts.

During your search for the keys an enemy might pop up suddenly when you have just mounted the stairs to the next floor. And the Bad Baron tends to move the keys around when you are not looking.

You use the keys I, J, L, and M to make your moves and press CTRL and one of those keys to fire in a certain direction.

The program was written in Acorn Atom BASIC, and this should help in translating for other machines. For example, the Atom's screen consists of 16 rows of 32 columns, and the second row starts at 8020, so change lines 15, 121, and 125 to suit your own machine. The program should then run.

The characters used to represent stairs, hiding places and other features are defined at the beginning and you can change them easily.

For those with Microsoft-style BASIC, use eg DS = "D". Line 30 provides an INKEY\$ FUNCTION, so for other BASIC's change line 100 to 100 K\$ = INKEY\$.

After defining variables, line 35 GOSUB's to the end of program text, so you can expand your introduction as much as memory space will allow. Lines 40 and 50 reset variables at the beginning of the game.

Line 40 starts with a function which ensures a random value for an address within the screen's limits. Line 50 uses a byte array and can be replaced by GS = "0123456789".

New floors start at line 60 with a beep and one second wait, followed by a row of information written to the top line of the screen. Line 65 POKE's obstructions are the random locations.

Lines 75 and 80 place the hides on the screen. Line 82 puts a key in one of them and gives a 1 in 4 chance of an enemy sleeping in one of the other hides. The array EE allows this extra one.

Line 85 and 87 invert the floor numbers where you have found keys, and also puts your player onto the screen.

Lines 110-115 convert the up-down-left-right choice to a screen address increment. Line 130 checks to see if a move would go off the screen. Line 145 reads the "fire" button so the same information is available to set direction of fire.

Before making a move the program looks at what is already there. If it is a hide a "W" character replaces an "H" character. If it is a key line 195 does a computed GOTO on an integer division on the floor number by nine. The program then branches to line 100 for all floors except nine, when it branches to line 3000.

By changing an enemy's character from "H" to "E" for hide characters you will have to step aside to avoid being trampled if you find an enemy.

The enemy move is made in lines 300 to 350. To make the lower floors easier on your way up the number of enemy is kept constant — line 310. But the enemy move is only made if the character at the specified address is "E". The routine only moves them up and down the screen but it is possible to make them move sideways.

If the enemy does get you your remains are marked with a cross in line 340.

Program variables. A own position. B bolts. C change of address. D Cown star character. E enemy character. EE9 enemy address. F floor number. G9 byte array. 079 if not got key. H hiding place character. HH3 hiding place address. I loop variable. K key pressed number. KKO label for assembly code. L key character on screen. M Mechanaracter (0=dead). N address of speaker. O obstruction character. P Princess rescued. Q quickest time. R random choice. S start of second row of screen. T time taken. U upstairs character. V enemy killed. W3 what's in the hide. Y previous best number of kills. Z last address of screen.



# NESS



**RUNS ON AN ATOM IN 3K**

**BY GEORGE TAYLOR**

```

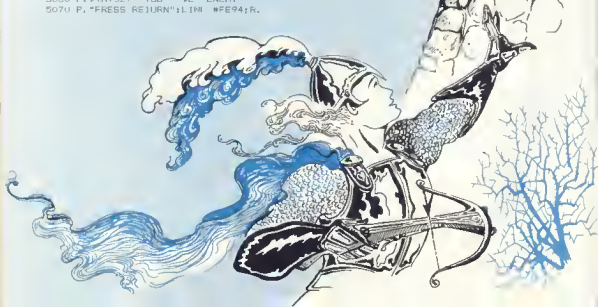
10 D=#84;E=#2A;H=#8B;L=#8B;M=#F;N=#B002
11 REM DOWNSTAIR, ENEMY, HIDING, KEY, ME, L/SPEAKER
15 O=#FF;O=#999;S=#B020;U=#95;V=U;Z=#B1FF
16 REM OBSTRUCTION, SCREEN 2ND LINE, SCREEN END
20 DIM EE(10), G9, HH(3), KPO, W3
21 REM KEYS GOT, ADDRESS OF HIDE9, ASSEMBLER LABEL
22 REM CONTENTS OF HIDE9, ASSEMBLER ADDRESS
30 DIM P-1;P,9;I(11);O JSP WFE71;STY #B0;RTS;I;P,95
31 REM INKEY$ SUB
35 T=0;V=0;G0S,5000;REM INSTRUCTIONS
40 A=S+A,R,%(Z-S);B=9;F=0;P=0;REM NEW GAME
41 REM ME POSITION, BOLTS, FLOOR, NO P/CESS
50 F,1=0;O9;S?I=1+4B;N,1;G,62;NO KEYS YET
59 REM START NEW FLOOR AT 60, NEW MOVE AT 100
60 P,9;F,1=1;O60;WAIT;N,1
64 P,9;12"KEYS          BOLTS    FLOOR "12(S-9)=B+4B
65 F,1=1;O54F+15;S? (A,R,%(Z-S))=0;N,1;REM OBSTRUCTIONS
70 F,1=0;O10;EE(1)=S+A,R,%(Z-S);N,1;REM ENEMY PDS.
72 F,1=0;O F,1;EE(1)=E;N,1;REM PLACE ENEMY
75 F,1=1;O2;S? (A,R,%(Z-S))=0;S? (A,R,%(Z-S))=U;N,1
76 REM PLACE STAIRS
80 F,1=0;O3;HH(1)=S+A,R,%(Z-S);THH(1)=H;N,1;REM HIDE
82 F,1=0;O3;W?T=32;N,1;W' (A,R,4)=E;W? (A,R,4)=L
83 REM ENEMY, KEY HIDDEN
85 T=0;M(2(S-1))=4B+F;F,1=0;O9;S? (I-27)=G?I;N,1
86 REM KEYS GOT ON SCREEN
87 ? (B-1)=6;F,1;F,1;REM INVERT FLOOR NO.
100 LINE KPO;k= #80;REM SCAN KEYBOARD
110 IF P,40;IF P,46;G0S, (B0+);G,130
120 G,300
121 C=-32;R,

```

```

1. C=-1;R.
123 L=0;R.
124 C=1;R.
125 C=32;R.
130 IF A+C=9:IF A+C=7:G,145: STAY ON SCREEN
145 G,300
145 IF 7*BU01664=0;G,4000:FIRE
150 IF A+C=32;G,250:MOVE ON
160 I=0:IF A?C: H;G,200:NOT HIDE
170 IF H(1):A+C:I=1+1:IF I=4;G,170:REM ADDRESS"
180 A?C=H?1:IF A?C=E:P,777:EE(F+1)=A+C;G,100
185 REM ENEMY HIDING
190 IF A?C: L;G,200:NOT FLY
195 G?F=F+176187(F-27)=G?F:1(S-1)=G?F;G,1100:F/9(2900)
200 IF A?C=0:F=F+1;G,200:UP ONE FLUOR
210 IF A?C=0:F=F+1;G,1000:DOWN ONE
270 ?A=32:A=A+C:7A=M:REM MOVE ME
300 REM MOVE ENEMY
310 F,1=0T010:C=EE(I)+32*(A-EE(I))-32*(A-EE(I))
312 IF C: S;G,330
315 IF C: Z;G,330:KEEP ON SCREEN
320 IF A=C:IF?EE(I)=E:P,5*0*7?"SLAT-YOURE DEAD":M=0
325 IF?C=32:IF?EE(I)=E: L=E:EE(I)=32:EE(I)=C
330 N,1:"N=7N:4:T=1+1:REM MOVE ONE ROW, CLICK
340 IF M=0:7A=HAB:L:LINK #FE94;G,35:MAR: GRAVE
350 G,100
1000 IF F 016,60:DOWN STAIR
1010 P,12"YOU ARE OUT OF THE CASTLE":IF P;G,1030
1020 P,"WITHOUT THE PRINCESS!""GO BACK YOU COWARD":F=0;G,60
1030 P,"IN"IT" SECONDS WITH "V"K"ILLS"
1040 P,"RESI IS"O"AND"Y:IF T:0:T=0:Y=V
1050 P,"WELL DONE THOU BRAVE KNIGHT!"L:LINK #FE94;G,75
2000 IF F,10:G,60:UP STAIR
2010 P,12"YOU ARE ON THE ROOF!""WHO DO YOU THINK YOU ARE?"
2020 P,"BATMAN?":F=9;G,60
3000 I=H:REM KEY HIDDEN
3010 IF G?1:128:1F19:I=1+1;G,3010
3020 IF 1-9:P,12*7"YOU MUST COLLECT ALL KEYS":G?9=H;G,60
3030 P,1247"THE PRINCESS":P=1;G,60
4000 B=8-1:I=0:IF B:0;G,100:FIRE BOLTS
4010 I=1+1:"N=7N:4:IF A?(1#C)=32:A?(1#C)=#32E;G,4010:DOTS
4020 I=0:IF A?(1#L)=E:V=V+1
4030 I=1+1:"N=7N:4:IF A?(1#C)=#32E:A?(1#C)=32;G,4030
4040 ?(S-9)=B+48;G,100
5000 P,12""SAVE THE PRINCESS""BY G.E.TAYLOR""
5010 P,"FORWARD" = 1"
5020 P,"LEFT" = J " L = RIGHT"
5030 P,"BACKWARD" = M"
5040 P,"FIRE" = CTRL"
5050 P,14D=32:(-32)U" STAIRS" 14D=32" OBSTRUCTIONS"
5060 P,14M+32" YOU "E" ENEMY"
5070 P,"PRESS RETURN":LINK #FE94;R.

```



# Memotech's New Memory System for the ZX81

## It grows as you progress

### MEMOPAK 16K



#### Memopak 16K Memory Extension

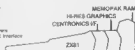
• £49.95 incl.VAT

It is a fact that the ZX81 has revolutionised home computing and coupled with the new Memopak 16K it gives you a massive 16K of Directly Addressable RAM, which is neither switched nor paged. With the addition of the Memopak 16K your ZX81's enlarged memory capacity will enable it to execute longer and more sophisticated programs, and to hold an extended database.

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#### Coming Soon...

Memopak 16K Graphics  
Centronics Interface and Software Drivers  
Memopak 64K Interface



All these products are designed to fit piggy-back fashion on to each other, and use the Sinclair power supply. WATCH THIS SPACE for further details. We regret we are as yet unable to accept orders or enquiries concerning these products but we'll let you know as soon as they become available.

#### How to order your Memopak.

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The 64K Memopak is a pack which extends the memory of the ZX81 by a further 56K, and together with the ZX81 gives a full 64K, which is neither switched nor paged, and is directly addressable. The unit is user transparent and accepts basic commands such as 10 DIM A(9000).

#### BREAKDOWN OF MEMORY AREAS

0-8K Sinclair ROM

8-16K This section of memory switches in or out in 4K blocks to leave space for memory mapping, holds its contents during cassette loads, allows communication between programmes, and can be used to run assembly language routines.

16-32K This area can be used for basic programmes and assembly language routines.

32-64K 32K of RAM memory for basic variables and large arrays.

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\*We reserve the right to reject, for discounting purposes, units which have been either opened or damaged in any way.

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64K RAM, Assembled		£79.00	
		Postage	£2.00
		<b>Total Enclosed</b>	

CV6

# sinclair selection

Computer and Video Games proudly presents two more exciting games for your Sinclair ZX81. Beat off an unearthly attack from the stars in War of the Worlds and win yourself a small fortune in Bet, a racecourse gambling game. We aim to cater for all kinds of Sinclair user — so we've chosen one 1K epic and one 16K special for you to play. So keep your finger on the laser fire button and don't lose your shirt...

Those nasty Martians are at it again. This time they are swooping from the sky to attack your laser base and smash it into the ground. You can fend them off by firing an invisible laser beam at them.

The laser base is printed at the bottom of the screen. You can move it left and right using the 'P' and 'A' keys.

The Martians appear at random positions on the screen and move down towards you. You must fire up your base below them and use the 'I' key to fire them. If they land on top of you the game will end.

If you manage to score 1000 the scoring rate will be doubled and the Martians will mutate into another form.

BY DAVID HEALEY

RUNS IN 1K

```

10 LET A=PI/PI
20 LET B=PI-PI
30 LET C=15
40 LET D=25
50 LET S=0
55 LET H=21
60 LET E$=""
70 LET G=A
80 CLS
90 LET X=INT (RND*25)
100 LET Y=INT (RND*H)
110 PRINT AT H,C;" "
115 IF Y=H THEN LET Y=H
120 PRINT AT Y,X;E$
125 IF Y=H AND X=C OR Y=H AND X=C+1 AND X=C+1 THEN GOTO 500
125 IF Y=H AND X=C+1 THEN GOTO 5
125 IF Y=H AND X=C+2 OR Y=H AND X=C+2 THEN GOTO 500
125 IF Y=H AND X=C+2 THEN GOTO 5
130 IF INKEY$="A" THEN LET C=C-1
135 IF C<0 THEN LET C=0
140 IF INKEY$="P" THEN LET C=C+1
145 IF C>25 THEN LET C=25
150 IF INKEY$="I" THEN GOTO 400
170 LET Y=Y+1
180 CLS
190 GOTO 110
400 IF C<X THEN GOTO 170
410 PRINT AT Y,X-A;" "
420 PAUSE 4
430 LET S=S+D
440 IF S=1000 THEN GOTO 500
450 GOTO 80
500 LET E$=" "
510 LET D=D+D
520 GOTO 80
530 CLS
610 PRINT "SCORE=";S

```

# WAR OF THE WORLDS

# BET

BY JO GARNER

RUNS IN 16K

```

10 REM "BET"
11 PRINT "TO PLAY YOU STATE YO
UR STAKE" AND THE HORSE YOU BE
T IT ON. IF YOU LOSE IT SUBTRA
CTS YOUR STAKE FROM YOUR TOTAL
L BUT IF YOU WIN IT MULTIPLYS
YOUR STAKE BY YOUR HORSE ODDS 1
0 AND ADDS ALL THAT TO YOUR TO
TAL YOU MAY QUIT AFTER P
RESSING 0 TO STOP
AT"
12 INPUT S%
13 REM (C) J. GARNER 1981 TO C+V
G.
20 LET M=50
25 CLS
30 LET A=5
40 LET B=4
50 LET C=3
60 LET D=2
70 LET E=1
80 PRINT "HORSES 1,2,3,4,5 ARE
PUNNING NOW WHICH ARE YOU BET
TING?"
90 INPUT N
100 PRINT "*****"
110 INPUT H
120 CLS
121 PRINT AT 1,16,"MONEY BET="
N,"MONEY LEFT="M-N,"ON HORSE
E,"N,""LEADER"
122 IF A=B AND A=C AND A=D AND
A>E THEN PRINT AT 7,23,"1"
123 IF B=A AND B=C AND B=D AND
B>E THEN PRINT AT 7,23,"2"
124 IF C=A AND C=B AND C=D AND
C>E THEN PRINT AT 7,23,"3"
125 IF D=A AND D=B AND D=C AND
D>E THEN PRINT AT 7,23,"4"
126 IF E=A AND E=B AND E=C AND
E>D THEN PRINT AT 7,23,"5"
127 PRINT AT 0,0,"*****HOR
SE RACE*****"
130 PRINT AT 15,0,"*****"
140 PRINT AT 20,0,"**FINISH**"
150 PRINT AT A,1,"1"
160 PRINT AT B,3,"2"
170 PRINT AT C,5,"3"
180 PRINT AT D,7,"4"
190 PRINT AT E,9,"5"
195 IF A=18 OR B=18 OR C=16 OR
D=18 OR E=16 THEN GOTO 400
200 LET Z=INT (RAND%+1)
210 IF Z=1 THEN LET A=A+1
220 IF Z=2 THEN LET B=B+1

```

Forget the Grand National and the Derby the ZX stakes is twice as exciting! You can win a fortune or lose your shirt — just like the real thing

First you bet on the runners, numbered 1 to 5 You have £50 to bet.

When the betting is out of the way the ZX81 will display the race course with the runners at the top of the screen at the starting post. The horses are represented by the inverse graphics characters 1-5.

If you win your stake is multiplied by the number of the winning horse. If you lose the computer will subtract your stake from your total. Then you have the opportunity of betting again on another.

The variable M sets up the value of your money. The variables A to E set up the positions of the horses at the start of the race. If you want to be a coward and save your cash you can finish the game.

```

230 IF Z=3 THEN LET C=C+1
240 IF Z=4 THEN LET D=D+1
250 IF Z=5 THEN LET E=E+1
260 GOTO 122
400 SCROLL
401 PRINT "HORSE NO.",Z," WON"
402 SCROLL
403 IF Z=N THEN GOTO 500
405 SCROLL
410 PRINT "*****"
420 SCROLL
430 LET M=M-N
431 IF M=0 THEN PRINT "*****"
432 IF N=0 THEN GOTO 2290
435 IF INKEY="" THEN GOTO 435
436 IF INKEY="0" THEN GOTO 200
G.
440 GOTO 25
500 PRINT "*****"
510 LET M=M+(M*N+10)
515 IF N=1000000 THEN GOTO 700
520 IF INKEY="" THEN GOTO 520
525 IF INKEY="0" THEN GOTO 200
G.
530 GOTO 25
700 PAUSE 100
705 CLS
710 IF N=1000000 THEN PRINT
YOU NOW HAVE A MILLION POUNDS
720 GOTO 620
0000 CLS
0001 FOR N=1 TO M
0002 PRINT AT 21,25,"E";N
0010 SCROLL
0020 PRINT "*****"
0030 SCROLL
0040 PRINT "*****"
0050 SCROLL
0060 PRINT "*****"
0070 SCROLL
0080 PRINT "*****"
0090 SCROLL
0100 PRINT "*****"
0110 SCROLL
0120 SCROLL
0130 PRINT "*****"
0140 SCROLL
0150 SCROLL
0160 SCROLL
0170 PRINT "*****"
0180 NEXT N
0190 SCROLL
0200 PRINT "PRESS 0 TO STOP"
0210 PRINT
0300 INPUT A%
0305 CLS
0310 RUN

```











```

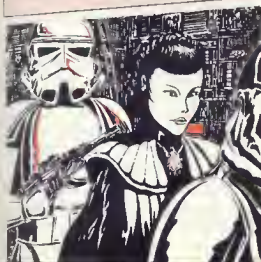
5075 IFND<10TBNPUTM1,T0,TC,CM,DR,BL,MD,GF,BJ,CR,LC
5100 IFND<11CLDSE
5125 GOTO10300
5150 IFV<110TNEWS225LSECLG:J=0:GOTO11200
5225 IFV<110TNEWS725
5250 IFND<10TNEWS250
5275 IFLC<12ANDLC<11PRINT" What button,";GOTO12125
5300 IFLC<11ANDMD<11BLETB=1:PRINTM3:GOTO12125
5325 IFLC<11ANDBLETB=0:PRINTM3:GOTO12125
5375 I=12:GOSUB21450:IFY<11THEN2725
5425 I=24:GOSUB21450:IFY<11THEN2725
5450 IFM1<1BPMINTN3:GOTO12725
5475 IFM1<1BPMINTN4:GOTO12725
5500 GOTO11150
5575 CLS:PRINT" M E L P ' ' ' :PRINT
5600 PRINT" Moche Soldiers are everywhere. I've been captureH."
5625 PRINT" I'm now a prisoner. Moche is se..."
5650 GOTO11500
5725 IFV<1120RND<01MEN6025
5750 IFB<10PRINT" But I don't have any ammunition left,";GOTO12125
5775 I=13:GOSUB21450:IFY<11PRINT" But I'm not carrying a BLASTER.";GOTO12125
5800 I=ND:GOSUB21450:IFY<11PRINT" I can't. I'm holding it,";GOTO12125
5825 IFND<13PRINT" zZaP!!":BL=1:GOTO12125
5850 IFY<1LCPRINT" I don't see it,";GOTO12125
5875 FORI=1TOLD:1FOR(I,0)=ND1THENS00ELSENEXT1:GOTO2650
5900 OR(I,1)=0:FORI=1TOTI:NEXTI:PRINT" zZaP!!" The "ND:ND:" v
aported."
5925 BL=BL-1:IFBL<0PRINT" I'm out of ammunition."
5950 GOTO12125
6025 IFV<113THEN6275
6050 IFND<10PRINT" Say what";GOTO12125
6075 I=14:GOSUB21450
6100 IFND<11ANDMD<11ANDLC<11ANDBLETB=1:PRINT" You're a Jedi!";GOTO12125
6125 IFND<10GOTO12725
6150 DR=1:PRINT" A voice cooes over the P.A. system and says:
OPENING FLIGHT DECK DOORS"
6175 IFLC<12ANDLC<11PRINT"
flips" There's no air!!" CROAK..."END
6200 GOTO12125
6275 IFV<114THEN6750
6300 IFND<120ANDMD<11ANDMD<11ANDMD<133THEN2650
6325 IFND<120THEN6550
6350 IFND<116THEN6450
6375 IFD(I,1)=1:PRINT" Sorry, I'm not a cartographer,";GOTO12125
6400 IFD(I,1)=1:PRINT" try SET MAP,";GOTO12125
6425 PRINT" It's not here,";GOTO12125
6450 I=ND:GOSUB21450:IFY<11LADNY<11THEN6425
6475 IFND<11PRINT" It says: >> NEEDS TURBO <<"

```

```

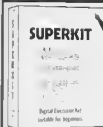
4500 IFND<13PRINT" It says: >> OUT OF ORDER <<"
4525 GOTO12125
4550 IFLC<113PRINT" I Hou't see any,";GOTO12125
4575 PRINT:PRINT" It says on the wall,"
4600 PRINT">> YOUR MOTHER'S GOT R BLS NOSE <<"
4625 PRINT">> KILROY MADE IT HERE, 100 <<"
4650 PRINT">> SLY SECURITY <<"
4675 GOTO12125
4700 IFV<115THEN6975
4775 IFND<10PRINT" What's a "ND:101:"";GOTO12125
4800 IFND<122PRINT" Don't be ridiculous,";GOTO12125
4825 I=22:GOSUB21450:IFY<11PRINT" I'm not holding it,";GOTO12125
4850 FORI=1TOLD:1FOR(I,0)=22THEN6075ELSENEXT1:PRINT" I don't know
where it is,";GOTO12125
4875 DR(I,1)=0:PRINT" Chug - Chug. Hume, good,"
4900 FORI=1TOTI:NEXTI:GOTO12125
4975 IFV<116RND<123ORLC<116THEN7125
7000 I=23:GOSUB21450:IFY<11PRINT" I'm not holding it,";GOTO12125
7025 D(I,1)=0:DBL(I,1)=14:CR=CR-1:PRINTM3
7050 GOTO12125
7125 IFV<117RND<1236THEN7275
7150 IFND<134ORLC<113THEN2650
7175 I=17:GOSUB21450:IFY<11PRINT" I'm not carrying a BLASTER,";GOTO12125
7200 HEA(1)=1:03=1:PRINTM3:GOTO12125
7275 IFV<119RND<01THEN7600
7300 IFND<134PRINT" That's stupid,";GOTO12125
7325 IFLC<135PRINTM3:GOTO12125
7350 I=22:GOSUB21450:IFY<11PRINTM3:GOTO12125
7375 IFND<135PRINTM3:GOTO12125
7400 IFND<134PRINTM3:GOTO12125
7425 IFV<110PRINTM3:GOTO12125
7450 FORI=1TOLD:1FOR(I,0)=34THEN7475ELSENEXT1:GOTO12125
7475 K=1:FORI=1TOLD:1FOR(I,0)=22THEN7500ELSENEXT1:GOTO12125
7500 PRINTM3:HEA(1)=1
7525 DR(I,1)=0:DBL(I,1)=14:CR=CR-1:PRINTM3
7550 FORI=1TOTI:NEXTI:GOTO12125
7600 IFV<117THEN7700
7625 PRINTM3:GOTO12125
7700 IFV<120THEN7975
7725 IFND<10THEN7650
7750 I=ND:GOSUB21450:IFY<11PRINT" I'm carrying it. That's suppose
ble,";GOTO12125
7775 IFY<1LCTHEN7850
7800 IFND<110RND<190RND<200RND<10THEN2650
7825 PRINT" I can't hit something I can't see,";GOTO12125
7850 IFND<150RND<250RND<34PRINT" I'd rather not. He might hit me
back";GOTO12125
7875 IFND<135PRINT" That's not nice,";GOTO12125
7900 GOTO12125

```





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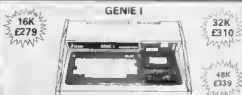
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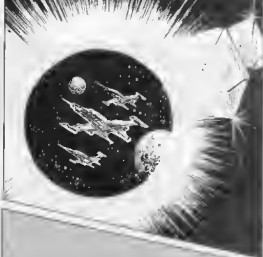
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32950 DATA0.0.0.0.0.0  
32960 DSA(12)\*"I'M IN ANOTHER HALLWAY TO THE EAST IS A RESTROOM"  
32970 DATA15.13.0.0.0.0  
33000 DSA(13)\*"THIS IS WHAT IS COMMONLY CALLED ON EARTH THE BAD ROOM  
THERE'S GRAFFITI WRITTEN ALL OVER THE WALL  
PIPES LEAD UP THROUGH THE CEILING"  
33050 DATA15.0.0.12.27.0  
33100 DSA(14)\*"THIS APPEARS TO BE AN INTERROGATION ROOM" DATA0.0.0.10.0.0  
33150 DSA(15)\*"I'M IN A LOUNGE" DATA0.0.13.12.0.0  
33200 DSA(16)\*"THIS IS A COMPUTER ROOM THERE'S A TRS-80 IN HERE ON THE SCREEN IT SAYS >> CSRA TAPE <<" DATA7.0.10.0.0.0  
33250 DSA(17)\*"I'M IN A TESTING LABORATORY" DATA0.0.16.0.0.0  
33300 DSA(18)\*"I'M IN A HALLWAY  
A LARGE ARROW POINTS EAST AND SAYS >> TO THE VAULT <<"  
33350 DATA16.25.3.19.0.0  
33400 DSA(19)\*"THIS IS THE ENTRANCE TO THE DEVELOPMENT LAB SEC11 ON" DATA0.18.21.26.22.0  
33450 DSA(20)\*"I'M IN A LONG CORRIDOR THERE ARE LABORATORIES ALL AROUND ME" DATA19.23.21.20.22.24  
33500 DSA(21)\*"I'M IN A RESEARCH LAB" DATA20.0.0.0.0.0  
33550 DSA(22)\*"I'M LOST" DATA22.22.22.22.22.20  
33600 DSA(23)\*"DATA(21) DATA0.0.20.0.0.0  
33650 DSA(24)\*"DATA(21) DATA0.0.0.20.0.0  
33700 DSA(25)\*"I'M NEAR THE ENTRANCE TO THE VAULT  
A SIGN HERE SAYS >> AUTHORIZED PERSONEL ONLY <<"  
33750 DATA0.26.0.10.0.0  
33800 DSA(26)\*"I'M IN THE VAULT" DATA0.0.25.0.0.0  
33850 DSA(27)\*"I'M IN A PIPE TUNNEL WHICH LEADS IN EVERY DIRECTION" DATA20.27.27.27.27.13  
33900 DSA(28)\*"DATA(27) DATA29.29.29.29.30.29  
33950 DSA(29)\*"I'M LOST IN A MAZE OF PIPES" DATA20.29.29.29.29.27  
34000 DSA(30)\*"I'M IN THE PIPE MAZE  
BELOW ME I THINK I CAN SEE THE JAIL"  
34050 DATA29.29.20.29.29.31  
34100 DSA(31)\*"I'M IN THE JAIL"  
34150 DATA32.33.34.25.0.0  
34200 DSA(32)\*"I'M IN A JAIL CELL" DATA0.0.31.0.0.0  
34250 DSA(33)\*"DATA(32) DATA0.0.0.31.0.0  
34300 DSA(34)\*"DATA(32) DATA30.0.0.0.0.0  
34350 DSA(35)\*"I'M AT THE SECURITY DESK  
TO THE NORTH AN ELEVATOR" DATA36.31.0.0.0.0  
34400 DSA(36)\*"I'M IN THE ELEVATOR" DATA0.0.35.0.37.0  
34450 DSA(37)\*"DATA(36) DATA0.0.14.0.0.36  
34450 LD=23 DIMOB(L0)  
34500 DSA(1)\*"A TAG WHICH SAYS >> NEEDS TURBO <<" DATA11.5.0  
34550 DSA(2)\*"ANTI-WRITER FUEL" DATA12.5.5  
34600 DSA(3)\*"BLASTER" DATA13.7.0  
34650 DSA(4)\*"COMBUSTIONATOR" DATA14.9.0  
34700 DSA(5)\*"A VERY SURPRISED GUARD" DATA15.9.0  
34750 DSA(6)\*"MAP OF THE SHIP" DATA16.29.20  
34800 DSA(7)\*"SOME KEYS" DATA17.9.0  
34850 DSA(8)\*"A SHIESTONE NECKLACE" DATA0.10.20  
34900 DSA(9)\*"PRINCESS LEVY'S CAPE" DATA21.14.5  
34950 DSA(10)\*"MCDONALD'S HAMBURGER" DATA22.15.0



35400 DSA(11)\*"A CASSETTE TAPE" DATA23.7.0  
35450 DSA(12)\*"A TURBOCHARGER" DATA24.17.5  
35500 DSA(13)\*"AN EVIL LOOKING SCIENTIST" DATA25.17.0  
35550 DSA(14)\*"SECRET ATTACK PLANS" DATA26.0.20  
35600 DSA(15)\*"DEATH RAY SCHEMATIC" DATA27.9.20  
35650 DSA(16)\*"CLOCKING DEVICE" DATA28.17.20  
35700 DSA(17)\*"MICRO LASER GUN" DATA29.24.20  
35750 DSA(18)\*"I D OARD" DATA31.17.0  
35800 DSA(19)\*"MILIDUM CRYSTALS (THE TREASURE)" DATA32.26.30  
35850 DSA(20)\*"A SIGN WHICH SAYS >> OUT OF ORDER <<" DATA33.3.0  
35900 DSA(21)\*"ATTACK ROBOT" DATA34.35.0  
35950 DSA(22)\*"PRINCESS LEVY" DATA35.34.50  
36000 DSA(23)\*"AMMUNITION" DATA37.7.0  
36150 DIMOS(CL5) RESTORE  
36200 FORZL=110CL FORZD=WTOS  
36250 READOS(ZL,2) NEXTZ NEXTZL  
36300 DIMOB(L0,2)  
36350 FORZL=110CL READOB(ZL,0),OB(ZL,1),OB(ZL,2) NEXTZL  
36500 DIMER(CL)  
36550 HEK(1)\*"I THINK HE'RE SUPPOSE TO LEAVE THE STUFF HERE"  
36600 HEK(2)\*"I WONDER IF HE HAVE ENOUGH FUEL"  
36650 HEK(7)\*"NOW ABOUT A BLASTER"  
36700 HEK(9)\*"TRY SHOOT GUARD"  
36750 HEK(13)\*"I MIGHT BE INTERESTING TO READ THE GRAFFITI"  
36800 HEK(17)\*"TRY SHOOT SCIENTIST"  
36850 HEK(22)\*"I'M AS CONFUSED AS YOU ARE" HEK(29)=HEK(22)  
36900 HEK(31)\*"IT MIGHT HELP IF HE HAD SOME KEYS TO OPEN ANY LOCKED DOORS"  
36950 HEK(35)\*"DID YOU BRING ANYTHING TO EAT?"  
37100 HBA="O I CAN'T GO THERE. THE DOOR IS LOCKED"  
37150 HBA="I'M NOT CARRYING ANY BLANK TAPE"  
37200 HBA="THE TRS-80 RECORDED SOMETHING ON THE TAPE. AND THEN I PRINTED  
>> ATTACK PLANS -- VERY SECRET <<"  
37250 HBA="O I CAN'T I'M NOT CARRYING ANY KEYS"  
37300 HBA="O K. THE DOOR TO THE JAIL CELL IS UNLOCKED"  
37350 HBA="THERE'S NO ROBOT HERE"  
37400 HBA="BUT I DON'T HAVE ANY HAMBURGERS"  
37450 HBA="CHUMP. CHUMP. BUMP"  
THE PRINCESS THANKS YOU FOR A DELICIOUS MEAL.  
37500 HBA="DOESN'T EAT HAMBURGER"  
37550 HBA="NOTHING HAPPENED THE HAMBURGER IS COLD YOU KNOW"  
37600 HBA="THE ATTACK ROBOT EATS THE HAMBURGER AND DISAPPEARS"  
37650 HBA="I'M AT THE IDENTIFICATION TERMINAL  
ON THE SCREEN IT SAYS >> SHOW I D. <<"  
37700 HBA="THE TRACTOR BEAM IS OFF"  
37750 HBA="THE TRACTOR BEAM IS ON"  
37800 HBA="YOU FORGOT TO OPEN THE FLIGHT DECK DOORS"  
37850 RETURN



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# B o i n g



Illustration: Terry Rogers

O REN DOING BY RON WEBSTER

ATARI TRANSLATION BY JAMES GARON

5 DIM B\$(10):FOR I=1 TO 10:READ I:B\$(I)  
>=CHR\$(I):NEXT I

10 GRAPHICS 0:POKE 82,5:POSITION 9,1  
13 ? " B O I N G " ?  
20 ? "Don't let Bouncing Barney down!"  
25 ? "Barney likes bouncing, but he"  
30 ? "has trouble staying on his"  
35 ? "trampoline. Use the joystick"  
40 ? "to keep it underneath him. If"  
45 ? "he hits the left side of the"  
50 ? "trampoline he bounces to the"  
55 ? "right. If he hits the right"  
60 ? "side of the trampoline, he"  
65 ? "bounces to the left. This if-"  
70 ? "fects Barney's bouncing score"  
75 ? "and more as the skill level"  
80 ? "increases, and makes it harder"  
85 ? "to keep him in the air. See"  
90 ? "how long you can keep Barney"  
95 ? "bouncing." ? : ? "Good Luck " ?  
100 ? "Barney needs it!"

110 OPEN #1,4,0,"K"  
120 ? " Skill level (0-9)?"  
125 GET #1,Q:Q=Q-48  
130 IF Q<0 OR Q>9 THEN 125  
140 W=(Q+2)/4:GRAPHICS 5:POKE 752,I  
145 SETCOLOR 4,I,2:SETCOLOR 2,4,2  
150 SETCOLOR 0,4,2:SETCOLOR 1,8,12  
155 COLOR I:FOR I=0 TO 5:PLOT I,39:ORA  
NTO I,0:NEXT I  
160 DRAWTO 74,0:FOR I=74 TO 79:PLOT I,  
0:DRAWTO I,39:NEXT I  
170 E=1:P=16:A=39:B=A:O=E:COUNT=1:V=14  
180 FOR I=0 TO 16:FOR I=15 TO 32 STEP  
17:POKE 656,0:POKE 657,I: ? CHR\$(I):  
185 FOR J=I TO 10:NEXT J:NEXT I:NEXT I  
190 POKE 657,16: ? CHR\$(11):FOR I=1 TO

BARNEY likes bouncing. In fact he likes it so much he bounces everywhere. He bounces off ceilings. He even bounces on a trampoline. But so far he has failed to work out that bouncing off the floor is harmful to his health. You have to protect Bouncing Barney from his own foxy by making sure the trampoline stays under his flying body as he hurtles up and down. There are ten skill levels to the game — but be warned. Level zero is so easy you might want to bounce directly to level nine. Don't do it! Level nine is for people who don't mind seeing their efforts result in messy consequences. Stick to the lower levels until you have developed your skill — for Barney's sake!

50:NEK I:POKE 657,16: ? " :FOR I=34  
TO 39  
200 COLOR 2:PLOT X,B:FOR I=1 TO 10:NEK  
T I:COLOR 0:PLOT I,B:FOR I=1 TO 50:MEK  
I:NEXT I:COLOR 2:PLOT A,B  
220 S=STICK(0)  
225 IF S>8 AND S<12 AND P>2 THEN P=P-1  
230 IF S>4 AND S<8 AND P<30 THEN P=P+1  
235 SOUND 0,150+248,10,V:V=V-2:IF V<0  
THEN V=0  
240 POKE 656,0:POKE 657,P  
242 IF B>38.5 THEN ? " Boing!":BOTO 2  
50  
245 ? B\$:  
250 COLOR 0:PLOT INT(A),INT(B):A=A-EB  
=B-0  
255 O=D-0,4  
260 IF A<6 THEN A=B:C=C-6:GOSUB 400  
265 IF A>73 THEN A=73:C=C-6:GOSUB 400  
270 IF B<1 THEN B=1:D=ABS(D):E=E-RND(0):  
0:1:GOSUB 400  
275 IF B<38.5 THEN 320  
280 B=39:D=E:V=14:LEFT=P+P  
285 IF INT(A)<LEFT AND INT(A)<LEFT+14  
THEN 310  
290 ? " ? " B P L A T " : ? " ,COUNT," Bounc  
e":IF COUNT>1 THEN ? "s"  
295 COLOR 2:PLOT INT(A),INT(B):FOR V=1  
4 TO 0 STEP -0.1:SDND 0,253,12,V:NEXT  
V:IF COUNT=I THEN ?  
300 ? " Skill level was " : ? :GOTO I  
20  
310 IF B>38.5 THEN COUNT=COUNT+1:E=E+R  
ND(0)/2:C=C-14-B-LEFT+RND(0):B/H/4  
320 COLOR 2:PLOT INT(A),INT(B):BOTO 22  
0  
400 SOUND 1,200,10,B:FOR TIME=I TO 10:  
NEXT TIME:SOUND 1,0,0,0:RETURN  
450 DATA 32,17,18,18,18,18,18,5,72,32

BY RON WEBSTER

RUNS ON AN ATARI IN BK

# PRACTICAL PROGRAMMING

## THE WAY TO BETTER PROGRAMS

Basic was designed to be easy to learn, so that people who are not professional programmers can write simple programs for themselves.

It is not easy to write long, complicated programs in any language, and is particularly difficult in Basic for several reasons, the main reason being the lack of suitable control structures.

In order to write a Basic program that works properly it is necessary to begin by designing the program carefully, and producing a detailed specification before beginning to write the code.

Top-down structuring is a method of program design where we begin with a general description of the program. Step by step, we add more details of the procedures the program must perform until we have a description that is sufficiently detailed to allow us to specify the data structure and write the code.

We need to use only a few simple structures in the description:

1. A sequence of procedures that are executed one after the other.
2. IF condition THEN procedure. If condition is true perform procedure, otherwise continue with the next section of the program.
3. IF condition THEN procedure 1 ELSE procedure 2. If condition is true perform procedure 1; if condition is false perform procedure 2; then continue with the next section of the program.
4. REPEAT procedure UNTIL condition. Perform procedure, then test condition; if false loop back to procedure, if true continue with the next section of the program. Note that the test comes at the end, so that

the body of the loop must be performed at least once.

5. WHILE condition DO procedure. Test condition; if true perform procedure then loop back to test condition again; if false continue with the next section of the program. Note that here the test is performed first, so that the body of the loop need not be performed at all.
6. CASE 1 OF procedure 1, procedure 2, ..., procedure n. If i is 1 perform procedure 1, if i is 2 perform procedure 2, etc.

The essential property of these structures is that they each have a single entry point at the beginning and a single exit point at the end. This makes it possible to write a program outline where the logical flow proceeds straight through from beginning to end.

It is not possible to write Basic code like this because GOTO statements make the logical flow of the program jump around all over the place.

## SIMPLE GAMES

To illustrate top-down structuring I will show how a simple game program can be developed. The game is one that has been published in various forms, sometimes in the simple form described here, but usually in a more sophisticated form with extra features.

The object of the game is to shoot down a plane which moves across the screen. The gun is fixed in the centre of the bottom line of the screen and is fired by pressing a single key.

We begin with a trivial description of the program: REPEAT play game.

UNTIL game over.

To elaborate this we take the procedure "play game" and note that it can be divided into two parts, updating the display and handling input from the keyboard, so the description becomes:

REPEAT update display  
handle input  
UNTIL game over.



"Update display" involves moving the plane, moving the shell if one has been fired, and taking appropriate action if there is a hit. At first sight it may appear that we can expand it to:

move plane  
IF shell fired THEN move shell  
IF hit THEN plane destroyed

But if we look more closely at the possible positions of the plane and shell we see that we may have the shell immediately to the right of the plane so the plane will run into the shell. Or we may have the shell one place to the right and one line below, in which case the hit will occur after both the plane and the shell have been moved. Our next expansion of "update display" could be:

move plane  
IF hit THEN plane destroyed  
IF shell fired THEN move shell  
IF hit THEN plane destroyed

Before continuing with this part of the program we need to look at the "handle input" section.

The description of the program says nothing about when and how often the gun may be fired. Program descriptions are often inadequate but top-down design will reveal where the deficiencies are.

If the gun could be fired continuously there would be no point to the game, so we must introduce some restriction. Two possibilities are to provide a limited supply of ammunition, or to allow the gun to be fired once each time the plane starts on a new line.

If we provide a limited supply of ammunition and allow the

BY TED BALL

# PRACTICAL PROGRAMMING

gun to be fired at any time while there is ammunition remaining, there could be several shells in motion at one time. To keep the program simple I will use the second possibility.

The "handle input" procedure can now be expanded easily. We have to first check that the gun can be fired — which means that it has not been fired since the plane started on its present line — and if so check for a key and fire a shell if the key has been pressed. The expansion may be written in stages as:

```
IF gun enabled THEN handle input
IF gun enabled THEN check keyboard
IF key pressed THEN fire shell
and finally
IF gun enabled THEN check keyboard
IF key pressed THEN set initial shell position
    write shell to screen
    set "shell fired" flag
    clear "gun enabled" flag
```

## THE LISTINGS

Collecting together the sections that have been developed so far gives listing 1. From this we can see that the procedures we need to expand now are "move plane", "move shell" and "plane destroyed".

When we expand "move plane" we must remember to check for the plane having reached the end of its run halfway down the screen or having reached the end of a line on the screen. Thus the first step in the expansion is:

```
write blank to current plane position
determine new plane position
write plane to new plane position
and for the next step we introduce the checks by expanding "determine new plane position" to
move plane position one place to right
IF end of line THEN set up for new line
```

IF end of run THEN set up for new run.

and expanding "set up for new line" and "set up for new run" we get:

```
move plane position one place to right
```

```
IF end of line THEN set plane position to start of next line
decrease score value
set "gun enabled" flag
```

```
IF end of run THEN add 1 to plane count
```

```
set plane position to start of screen
set score value to initial value
set "gun enabled" flag
```

"Move shell" is expanded in a similar way, but remembering to delete the shell when it reaches the top of the screen:

```
write blank to current shell position
move shell position up one line
IF off screen THEN clear "shell fired" flag
ELSE write shell to new position
```

"Plane destroyed" appears in two places and in the final program we will obviously want to implement it as a subroutine.

To indicate this we will replace "plane destroyed" in the body of the program description by "subroutine (plane destroyed)" and put the expansion in a separate section at the end.

The expansion of "subroutine (plane destroyed)" is straightforward:

```
clear "shell fired" flag
simulate explosion on screen
add score value to player's score
set up for new run
with "set up for new run" being expanded in exactly the same way as before.
```

This leaves the final test "game over" to be expanded. Since the game consists of shooting at a fixed number of planes "plane count more than number of planes".

Putting these latest expansions into the program description of listing 1 gives the final program description shown in listing 2.

This final description gives almost all the detail we need to write the program.

### Listing 1 Intermediate Program Description

```
REPEAT move plane
IF hit THEN plane destroyed
IF shell fired THEN move shell
IF hit THEN plane destroyed
IF gun enabled THEN check keyboard
IF key pressed THEN
    set initial shell position
    write shell to screen
    set "shell fired" flag
    clear "gun enabled" flag
UNTIL game over.
```

### Listing 2 Final Program Description

REPEAT write blank to current plane position

```
move plane position one place right
IF end of line THEN
    set plane position to start of next line
    decrease score value
    set "gun enabled" flag
IF end of run THEN
    add 1 to plane count
    set plane position to start of screen
    set score value to initial value
    set "gun enabled" flag
write plane to new position
IF hit THEN subroutine (plane destroyed)
IF shell fired THEN write blank to current shell position
    move shell position up 1 line
    IF off screen THEN clear "shell fired" flag
    ELSE write shell to new position
IF hit THEN subroutine (plane destroyed)
IF gun enabled THEN
    check keyboard
IF key pressed THEN
    set initial shell position
    write shell to screen
    set "shell fired" flag
    clear "gun enabled" flag
UNTIL plane count more than number of planes
```

Subroutine (plane destroyed)

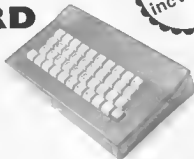
```
clear "shell fired" flag
simulate explosion on screen
add score value to player's score
add 1 to plane count
set plane position to start of screen
set score value to initial value
set "gun enabled" flag
```



# ZX80/1

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# Graphics



## THE IMPORTANCE OF CURVES...

If you want to produce interesting displays for your video games then it is essential to be able to draw curves.

Straight lines tend to be characteristic of man-made structures and not of natural objects. Most high resolution graphics systems on micros have commands such as DRAW or PLOT for drawing straight lines, but do not have commands for drawing curves. For this reason, a curve has to be approximated by a series of linked line segments.

The shorter the segments are, the more a realistic the approximation to the curve becomes. The limit to which this can be taken is determined by the resolution of the display screen. With any system having a screen resolution of, say, 256 by 192 or better, convincing curves can be drawn by joining points in adjacent screen columns as long as their vertical separation is not too great. These thoughts naturally lead to the problem of scaling.

The basic idea with scaling is that when a particular curve is to

be drawn it must be scaled — magnified or diminished — in such a way that it fits on the screen, and is also displayed to best effect.

This is probably best illustrated by an example, so let us examine how to draw two cycles of a damped sine wave on the Atom's screen, which has a resolution of 256 by 192. With a damped sine wave, the size of the oscillations decreases as the waveform proceeds. The equation of the curve we shall plot is:

$$Y = \sin(X) * \exp(-X/8)$$

Now two cycles are obtained by letting X vary from 0 to  $4\pi$ . To plot the curve across the screen with full resolution, we start with a dot in column 0, on the left of the screen, and repeatedly draw a line to a dot in the next column, doing this 255 times until we get to the right hand side.

To make X increase from 0 to  $4\pi$  in this pattern, it must be repeatedly increased by increments of  $4\pi/255$ . Thus the kernel of the program becomes

```
FOR I = 0 TO 255
  X = I*(4*PI/255)
  Y = SIN(X)*EXP(-X/8)
  DRAW I,Y
NEXT I
```

However, the vertical axis still needs to be scaled. The curve shows to best effect with its

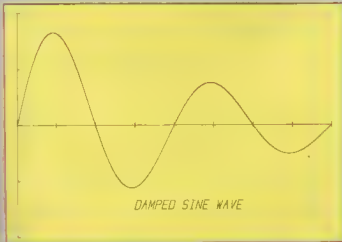
x-axis across the middle of the screen, so we place it along row 95. Assigning 90 dots vertically to the full amplitude of the sine wave gives the final, tidied-up, Atom program

```
10 S = 4*PI/255
20 CLEAR 0
30 MOVE 0,95
40 FOR I = 1 TO 255
50 X = I*S
60 Y = (90 + SIN(X))*EXP(-X/8)
70 DRAW I,Y
80 NEXT I
90 END
```

Experimenting with this program by changing the numbers in it will give a further feeling for how the scaling, positioning and damping are achieved.

To illustrate how simple matters such as scaling and positioning can be made, consider the drawing shown in the figure, which includes not only our curve, but also two axes and a label. It was drawn using a Hewlett-Packard HP7225A graph plotter attached to an HP 83 personal computer. The program that produced it is:

```
10 GCLEAR
20 SCALE 0.4*PI, 1.1
30 XAXIS 0,PI/2
40 YAXIS 0,0.5
50 MOVE 0,0
60 S = 4*PI/255
70 FOR X = S TO 4*PI STEP S
80 DRAW X SIN(X)*EXP(-X/8)
90 NEXT X
100 CSIZE 6,0.5,0.25
110 MOVE PI - 0.2
120 LABEL "DAMPED SINE WAVE"
130 END
```



In this program the SCALE instruction in line 20 gives the lower and upper limits of the X values to be plotted and also of the Y values. All plotting can then be performed using the actual values to be plotted since the system can then automatically position them correctly.

Of course, the HP personal computer is a sophisticated and expensive system, but its capabilities illustrate what can be done, and also the direction which graphics facilities for micros are likely to take

**By Gary Marshall**

# SOFTWARE SOFTWARE SOFTWARE REVIEWS REVIEWS REVIEWS

## THE GOSPEL TRUTH ...

Have you heard any clips of thunder recently? It could be that someone in your area has bought a copy of *The Bible*. Not the authorised version or even the New English but the version according to Automata — and in doing so has angered the almighty!

*The Bible* is an irreverent look at some of the happenings in that epic story. The extracts are illustrated by games played on the ZX81 computer. There are ten games and all of them are within 1K of memory.

### THE BIBLE

Don't just load the games through. Unplug the ear lead and listen to the story recorded on the tape. The nearest I can come to describing it is a version of *Not the Nine O'Clock News* on tape.

The characters on the sound-track will tell you when and how to load the programs which supplement the text.

But what of the programs? As I said they are all 1K and of necessity therefore, limited.

Most of them I have seen before in one form or another.

I did find one or two quite amusing. Goliath's soft spot is no longer his forehead but somewhere lower down and almost as painful. You can also bring down the plague on the Pharaohs head and free the slaves. Save Jonah from the sea monster by directing the whale to him first. Stop the Ark from sinking or tempt Adam away from the evil, ZX81.

If you have just bought a ZX81 then this tape will provide some amusement. The same might apply if you have a warped sense of humour. Otherwise I can find little of any value in it for those of you looking for original games software.

The Bible is available from Automata Cartography for £5.00.



## CUBE WILL HAVE YOU IN A SPIN

### QUADCUBE

There seems to be very little middle ground with *The Cube* — either you can't stop twiddling it or you just don't want to know. Here's a game for the fanatics.

This program simulates a 4 x 4 x 4 cube — physically very difficult to make, but easy on a computer. The program can to a limited degree simulate a 3 x 3 x 3 cube. The object is — of course — to solve the cube in as few moves as possible.

In *Quadcube* the display is slightly distorted but recognisable (I liked 'to fidence tones' on the key presses — all input is handled by 'call key' routines, and there is an immediate indication that your pressed key has been scanned).

Documentation supplied was of a high standard. There is also adequate internal documentation for when, as always happens, you

lose the instruction sheets.

The game has its restrictions. The graphics are unsatisfactory on a monochrome set and it will not run in extended BASIC.

The notation used is very simple and easy to use, but I was a little unhappy with 'spin' and 'unspin' which permit you to view the back. The effect of 'spin' and 'unspin' seems to be to present you with a mirror image — or to make the front three faces transparent. This makes the moves a little hard to visualise.

In this version all rotations are described as they appear on screen — clockwise is described as right.

I would have appreciated a small note on screen to indicate which face was X, which Y, and which Z. Memory space is tight but the program can be compacted to permit this, without losing any features.

You can scramble a virgin cube and watch the computer put it back, or the computer will scramble the cube.

The game runs on a Tascam Instruments 99/4A in TI Basic and comes in cassette form for £9. It is available from Luton based Workforce.

## DOING THE SHUTTLE SHUFFLE ...

### SPACE RESCUE

Five spherical life support pods are stranded on hazardous alien terrain. In space the mother ship prepares for a rescue mission.

The mother ship has a rescue hatch and a storage area to accommodate all five pods. The ship's recovery shuttle — controlled by means of the Pet's keyboard — is sent to save the pods.

The shuttle is released by pressing '2' to move it downwards. From this point on your score increases by one for every second you survive.

To rescue a pod, the shuttle must be positioned immediately above it, then the 'A' key pressed. This manoeuvre can be very difficult on the higher skill levels since the shuttle moves rather fast and the control key becomes highly responsive.

Next the shuttle should be guided to a position just above the mother ship and the pod

dropped through the rescue hatch by pressing '0'. If your aim is correct, the pod appears in the storage area. If you miss the hatch the pod lands back on the planet surface.

If you manage to complete your rescue mission and save all five pods, you are invited to dock with your moving mother ship for a bonus of 500 points.

Once you have successfully carried out a rescue you can progress to slightly higher skill levels building up your expertise until you have used up your four lives.

The more difficult the game gets the more interesting it becomes. Not only do you have to guide your ship accurately you also must fend off meteorites which fly dangerously through the sky.

No additional documentation was supplied with the game which would have been useful. The instructions only appear on the screen briefly once, after loading so some experimentation was needed to learn the finer aspects of the game.

Supersoft, the supplier of *Space Rescue*, has created another addictive game because like most good ones it cannot be easily mastered. You can try it out for £3 plus VAT.

## A colorful illustration of a blue steam locomotive with a smiling face, pulling a brown passenger car. The train is moving along a track that curves to the left. In the background, there is a bridge, a signal post, and some buildings under a blue sky with white clouds.

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# Kit Ko'tnet

## THE POWER OF THE ATOM...

It is refreshing to see, in these times when the reliability of some newer machines has yet to be proven, an already well established product which can be expanded from a useful basic kit to a powerful multi-program microcomputer. I have been looking over a kit built Acorn Atom — and found it to be just that.

The Atom is a single board layout, measuring 14 by eight inches. The basic kit has an 8K BASIC and 2K of RAM but can be expanded to 12K RAM. The MPU is the trusty 6502 running at 1MHz, although there is a second crystal to run the Motorola video chip. Make sure which is which, as they are both the same size and shape. Only the numbers are different.

The full QWERTY keyboard is mounted on the other side of the board from the components as is the speaker. The power supply is entirely separate, however.

The Atom has an advantage over some of the smaller and more recent machines in that it has the facility for a 6522 Versatile Interface Adaptor (VIA) on the board.

The Atom also allows for other inputs/outputs. There is a printer interface, which uses one half of the VIA, a standard CUTS interface for the recording or playing back of programs, a composite video and T.V. output. Not all of these are fitted as standard to the basic model, so find out which ones you are going to need before buying as it will be slightly cheaper.

As there are 52 potential IC sockets on the board it is worth mentioning that 14 pin sockets will go into 16 hole sets, as will 14 and 16 into 18 hole sets. If you do solder in the wrong size it is often impossible to retrieve it unless you have an IC desoldering tool for your soldering iron.

### BY KEITH MOTT

The only real way to extract them otherwise is to force the plastic moulding off and to remove the pins individually. You will have to replace the holder then, of course. The same applies to the larger sockets, although these are a little easier to differentiate between.

One major point that does worry me about the Atom is the way Acorn have arranged the keyboard, however smooth it is to operate. Acorn recommend a quite simple way of installing it in the instructions. They also state that insulating washers should be used with the steel



screws to prevent shorting out of the keyboard matrix. This is because all but one of the screws falls between two adjacent pads.

Although the model I was appraising did not have any washers, with the length of connector wire on each of the keys it is possible for them to short out despite this precaution. They also suggest that you do not solder each of the connections too heavily as you may break the plated-through hole. It appears to me that it would be as easy to fracture the lead as it would the pad when the solder contracts as it cools. This would lead to an almost incurable fault as all the keys would have to be removed before repairs could be effected. I am sure the solid contact type would be preferable.

The board has been constructed well on thicker-than-usual piece of fibreglass with

silk screen overlay to help place the components.

There are a few components, however, which have to have their legs bent quite considerably to get them positioned correctly. I am sure that some of the capacitors and especially the crystals could be damaged easily by this action by an over-zealous assembler.

Everything else seems to go in quite neatly even though the voltage regulators do look a little hidden from view by their common heat-sink.

As is usual with the better designed kits the holes for the transistors are laid out for insulating pads although these are not included. Thankfully these transistors are of a larger body type than the ones which started off my campaign, and should tolerate a little more heat than those could.

As all the IC holders are supplied take care that you insert the right chips in the right sockets. Fortunately, all the chips are orientated with pin one towards the top or right of the board, which helps considerably. Another point about orientation is the electrolytic capacitors which are used to smooth the power supply. They are scattered around about the regulators and vary in their direction of polarity. Each is marked with its own polarity as is the board where it resides, so there should be no excuse for getting it wrong.

The Acorn Atom comes in a very sturdy case which is the size of many machines' keyboard alone. Even though not all the possible options are included in the basic kit the back panel is already cut out to accept them all. It would be a good idea to block up the larger holes to prevent dust and dirt from getting into the machine, so long as the regulators do not get too hot.

The power supply, as I said is separate from the machine, and plugs into the back of the box. It is heavy enough to power all of the options and more. External power is available from one of the back connectors if required.

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# DOWN TO BASIC

## STORING AWAY YOUR SCORES

Sometimes it is necessary to store a set of related data items while processing them in a program. For example, you might want to store a set of game scores and then sort them into order.

To do this you can store them in a list — or, as it is sometimes known, a one-dimensional array.

To create such a list, you must first of all inform the computer of the name and size of the list. This is done by using a DIMension statement which takes the form

(line no.) DIM (array-list)

For example,

```
15 DIM A(30)
```

would set up a list called A which could hold up to 30 data items. It is possible to declare several lists in one DIM statement.

```
20 DIM L1(5), L2(5), L3(100)
```

In general, the rules for forming names of lists will be the same as those for forming names of variables.

To refer to a particular item of a list, use subscripts enclosed in brackets after the name of the list. The subscript indicates the position of the item in the list.

A(6)

refers to the item in position 6 of the list called A.

A subscript may be a constant, variable or any other valid arithmetic expression. If the value of the subscript is non-integer, then it will be truncated to an integer value.

The value of the subscript should lie in the range,

1 —> (size of list)

In some systems, the subscript may also take the value 0.

Elements of lists are sometimes referred to as "subscripted variables", and may be used in a manner similar to ordinary variables. The following are all



examples of statements containing subscripted variables:

```
10 INPUT A(2), X, L1(10)
30 LET S = A(1) + A(2)
40 PRINT B(6)
25 IF A(1) = A(2) THEN 10
30 FOR I = A(N) TO A(N+6)
```

## LISTS, STRINGS AND CHARACTERS

It is also possible to have a list of character strings e.g. a list of names.

Such a list may be created in a manner similar to a list of numeric values except that the name of the list is followed by a "5".

```
10 DIM A(10), N$(5)
```

would set up a list A, comprising of up to 10 numeric values, and a list N\$, comprising of up to five character strings.

The subscripts of a string array follow the same rules as those of an ordinary one-dimensional array (list), and the items of a string array may be used in a manner similar to string variables.

## GETTING THINGS IN ORDER ...

A very common operation in computing is sorting a list of items into order e.g. sort a list of heights into ascending order, sort a list of names into alphabetical order. I will now look at a program that could be used to sort a list of 10 numbers into ascending order.

I should point out that the method I shall use is only one of many sort methods. It is a fairly simple method but not the most efficient. The choice of a sort method depends on the number of items to be sorted and the attributes of these items. Many commercial applications involve sorting very large numbers of items in which case efficiency becomes very important. The method I shall describe should suffice for the most simple applications.

This method basically consists of working through the list comparing pairs of adjacent items —

**BY MOIRA NORRIE**

# DOWN TO BASIC

```

if necessary swap the items so
that they are in the correct order
with respect to each other.
rem input data
repeat for each position in list
  input item in list-position
end repeat
repeat for each cycle
  let swap count = 0
  repeat for each pair
    if pair in order then goto end
    repeat pair
      swap pair
      add 1 to swap count
    end repeat pair
  if swap count = 0 then goto
  print results
end repeat cycle
rem print results
repeat for each position in list
  print item in list-position
end repeat

```

This general program outline can be expanded into the following program. The best way to understand the program is to work through it using pencil and paper with some sample data.

## NOW GET DOWN TO WORK ...

```

10 REM SORT 10 NOS IN
   ASCENDING ORDER
20 REM INPUT THE 10 NOS.
30 DIM A(10)
40 FOR I=1 TO 10
50   INPUT A(I)
60 NEXT I
70 REM SORT NOS.
80 FOR t=1 TO 9
   90   LET S=
100   FOR J=9 TO 1 STEP -1
110     IF A(J) > A(J+1)
120       REM SWAP A(J) AND
        A(J+1)
130       LET T=A(J)
140       LET A(J)=A(J+1)
150       LET A(J+1)=T
160       REM ADD 1 TO
        SWAP COUNT
170       LET S=S+1
180     NEXT J
190   IF S=0 THEN 210
200   NEXT t
210 REM PRINT RESULTS

```

```

220 FOR t=1 TO 10
230   PRINT A(t);
240 NEXT t
250 END

```

In the worst case, all cycles would have to be performed before the numbers were in order. However, in many cases the numbers will be sorted before the last cycle. For this reason, a count of the number of swaps in any cycle is included. If in any cycle there are no swaps, then the numbers are in order and there is no need to continue.

## COMMODORE BASIC

**VARIABLES** Names of variables may be of any length and consist of any combination of letters and digits provided they start with a letter — however, only the first two characters are significant.

If a variable name is followed by %, it is an integer numeric variable and will take only integer values.

Integer variables cannot be used as control variables in a FOR loop. **STATEMENTS** Can have more than one statement per line using a " " as a separator.

Numeric values will be converted from one type to another type when necessary e.g. if a real value is assigned to an integer variable, then the real value will be truncated to an integer.

The form of the IF statement is either of:  
(line no.) IF (condition) THEN (statement(s))  
(line no.) IF (condition) GOTO (line no.)

The ON statement can be used to transfer to one of a list of line nos. depending upon the value of a given expression

(line no.) ON (expression) GOTO (list of line nos.)  
(line no.) ON (expression) GOSUB (list of line nos.)

CLR clears all variables and memory space.

END terminates execution — can appear at any point in the program.

GET reads a character from a file or the keyboard buffer.

## NEXT MONTH

It is possible to have an array with more than one dimension. The commonest case being the two-dimensional array — a table of related data items. Next month, I will describe the use of those two-dimensional arrays and I will also include an example showing the use of string arrays.

The version of Basic summarised in the next issue will be the Atari.

**NEXT** is no variable, then it is matched with the most recent FOR statement.

**POKE** writes specified value at specified memory address.

**SYS** used to call an assembly language subroutine.

**WAIT** used to suspend program execution.

**FUNCTIONS** **ASC** returns the ASCII code of the first character in the specified string.

**CNRS** converts code number to character.

**FRE** returns the amount of free memory space.

**LEFTS** returns the leftmost characters of a string.

**MIDS** returns a specified substring of a string.

**PEEK** value of byte in specified memory address in range 0 to 65535.

**POS** returns the cursor position.

**RIGHTS** returns the rightmost characters of a string.

**SPC** used in a PRINT statement to supply spaces.

**STATUS** returns status corresponding to last I/O operation.

**STR\$** converts number to character string of digits.

**TAN** tangent.

**TIME** read internal clock.

**USR** calls the user's assembly ten guage subroutine.

**VAL** treats the specified string as an arithmetic expression.

Plus **ABS**, **ATN**, **COS**, **EXP**, **INT**, **LEN**, **LOG**, **RND**, **SGN**, **SIN**, **SQR**, **TAB**, **GRAPHICS** Screen has 25 rows and 40 columns.

Special graphics characters.

# AS THINGS GET TOUGH

WHAT DO YOU DESIRE?

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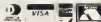
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# HARDCORE

## A GAMES PLAYERS GUIDE TO THE VIC-20

### EXPANDING MEMORY

The VIC-20 comes with 35K of usable memory and serious users will soon have to start thinking of expanding.

There is quite a choice about how you increase your VIC's memory. Commodore produces a memory expansion board which plugs on to the back of the machine and allows the user to stick in extra memory cartridges

The Commodore cartridges presently available offer an extra 3K, 8K and 16K of RAM — £29.95, £44.95, £74.95 respectively. The memory board connects to the VIC expansion port, and has six ports to allow the user to have all three memory cartridges, plus programming aid cartridges plugged in at once, it costs £125.95

Stack has a wide range of memory expansion kits using a piggy-back technique 3K costs £25; 8K, £82 and £89, 16K, £124 and £99; 24K £167 or £129

Stack also offers a special memory board which allows the user to protect 18K of memory so that programs can be kept in while the machine is switched off. A battery keeps the programs in memory for up to a year and with 19K of memory it costs £198

Stack Computer Services is at 290/296 Derby Road, Bootle, Liverpool 20, Merseyside

Arfon Micro has a VIC expansion system which allows up to seven cartridges to be added on to the machine. The memory expansion board costs £95 and the firm also produces three memory cartridges 3K costs £26.04, 8K, £39.09 and 16K £65.17 (all plus VAT)

Arfon Microelectronics can be found at Celyn Industrial Estate, Cernarlon, Gwynedd, North Wales

Bealines gives the user a chance to expand his VIC up to 35K and have a 40 column by 24 row layout compatible with the viewdata standard. This expansion unit costs £253. Bealines is at 124, Newport Street Bolton, BL3 6AB

### CHARACTER DEFECTS

The main criticism of the VIC is the lack of character space it allows on the screen.

The screen layout is 23 lines deep and 22 characters long. As a result the text seems too clumsy to be pleasant to read and only short pieces of a program can be listed on screen at any time. Each character is formed by an 8 x 8 bit matrix, so in high resolution mode there is a possible 176 x 194 points to play with.

Up to 16 colours can be generated by the machine. Each character and the screen border can be one of eight different colours

The prospect of a low cost colour computer supported by a company of Commodore's pedigree was the rich promise offered to the personal computer public last summer.

The promise was some time being fulfilled as a large backlog of orders built-up while the bulk shipping of computers from the German factories was delayed. But the personal computer user is used to frustrations of this sort and waited patiently. Now the VIC is rewarding that patience with a quickly growing range of games and game peripherals and a sales figure of 15,900 a month.

For your £199.99 (after VAT) you will receive the VIC computer complete with a QWERTY keyboard, a lead to plug into a home T.V. and a power supply lead. It comes complete with 35K of usable memory.

The VIC's bright colours and graphics are well suited to gaming and a dozen firms are producing games software for the machine. The peripherals come from just a few firms but there is already a wide range. Names and addresses are laid out below — if an address is missing it will be included elsewhere

Commodore is based at 675, Ajax Avenue, Slough Trading Estate, Slough, Berks, SL1 4BG

and the background, one of 16 possible colours.

Sound wise the VIC is equipped with four voices, alto, tenor, soprano and white noise. It also offers a volume control which ranges from 0 to a very loud 15.

Coppy arcade games is usually a good test of a computer's sound and graphic facilities and the VIC produces some very faithful copies. The range of graphics characters provided by the VIC can be supplemented by defining your own graphics made up of 8 x 8 pixels

Commodore produces a super expander hires cartridge to help improve the graph-



Botanist, T.V. presenter and target man: the character, David Bellamy aims to grips with some of the VIC 20's larger than life characters on his T.V. screen.



# HARDCORE

## A GAMES PLAYERS GUIDE TO THE VIC-20

ics capabilities and it costs £34.95. It includes commands like paint, colour, draw circle and sound.

### SOFTWARE SUPPLY

Software for the VIC is growing in supply to meet demand.

At least 10 software firms are turning to VIC-20 production, some of which began in the business by supporting the Pet so many of the programs first on sale for the VIC are conversions.

Mr Micro of Manchester is an example of this type of firm. It started with Pet programs but now has moved on to VIC games. Over 40 programs are listed in his catalogue including Gold Rush which is a similar idea to the recently sold puzzle, passed in the book *Masquerade*. The object is to win a real nugget of gold by solving the game, the nugget going to the first person to do so. Another is a game entitled the Great Ballon Race.

Mr Micro can be reached at PO Box 24 Swinton M27 3AL.

Bug Byte is another major supplier having moved on from the Sinclair ZX81 and the Acorn Atom on its lists at the moment are Vicman, which is a version of Pacman, Vicgarmon (backgammon), and a version of breakout called Another Vic in the Wall.

D K'notes is in the process of building up its VIC-20 software library. Currently with Rox and Oxfax on the books and one cassette with ten programmes they cost £4.95 each and £8.95 for the multi program pack. An 8K hi-resolution Rox will soon be available for £4.95.

Some 17 programs are on the catalogue from Audiogenic including well-known games like Alien in which you have to trap foreign beasts and bury them in holes in the ground. That costs £7.99 for the pleasure. Also on the list is Star Wars the game based on the adventures of film screen hero Luke Skywalker. It costs £6.99.

Audiogenic imports games software from the American firm Creative Software who supplies VIC programs. The firm can be reached through PO Box 34-36, Crown Street, Reading, Berkshire.

Liverpool based Supersoft is just beginning to branch into VIC software after having been one of the leading Pet software suppliers. First off the production line is an ana game called Nightmare Park which should sell for £4.99. And a war-based game Tank Battle is shortly to be available but has not got a fixed price yet.

For further details write to Supersoft at 1st Floor, 10-14 Canning Road, Walsby House, Harrow, Middlesex.

Smaller firms providing a more limited range of software are as follows: Anglo American Software, 135a Stratford Road, Sparkhill, Birmingham, B11 4AG; Big Softie, 5, Ashton Park, Belfast, BT10 0JQ; Bridge Software, 36 Fernwood, Marple, Bridge.

Stockport, Cheshire, G. Moore, 4, Ackers Road, Woodchurch, Birkenhead, Merseyside; Gibson & Harvey Enterprises, 49 St Leonards Road, Bexhill on Sea, East Sussex, H-Tech, 7 Queensway, Hemel Hempstead, Hertfordshire.

Thorn EMI is also in the process of developing software for the VIC-20.

Commodore itself is supporting the VIC with a range of ROM cartridges and also has a very addictive cassette game called Blitz. It costs £4.99.

### JOY OF STICKS

Any game who has struggled with four directional keys while trying to keep hell in his mind focussed on the "fire" button knows who put the "joy" in front of "stick".

The VIC-20 currently has two joysticks available. The Commodore version costs £7.50 and includes a fire button.

Stack Computer Services includes joysticks in its large range of VIC peripherals. These retail at £73 each.

Commodore also offers a pair of paddles for £11.74 (plus VAT).

Stack supplies a light pen for the machine which works in both normal and hi-res modes, allowing interaction with the screen without using the keyboard, it costs £25.

Like the Pet the VIC-20 uses a specially made Commodore cassette recorder to load programs. It interfaces directly to the computer and includes a tape counter. The recorder uses standard cassettes and costs £44.95 (after VAT).

A single drive floppy disc unit for the VIC is available from Commodore. It has 174,848 bytes storage capacity and uses standard 5 1/4" single density floppy discs and costs £396 (after VAT).

The Vic printer's features include: 80 characters per line, a 30 character per second print speed, and double size graphics. It is a dot matrix printer and costs £230 (after VAT).

Stack produces a VIC-RS232 interface which will allow the computer to be connected to mainframe computers and act as a terminal or drive a daisy-wheel printer. It costs £49. A low-cost version of a bi-directional RS232 interface costs £17.25 and is also available from Stack.

Commodore's RS232C terminal type interface provides the opportunity to connect to telecommunications controllers and other computers it costs £34.95. Daisy-wheel printers can be interfaced to the computer via the Commodore IEEE-488 cartridge for £54.50.

Among Stack's other offerings are a VIC games port cable adaptor which gives you two games ports for joysticks and light pens; £17.25, a games port multiplexer needed for two joystick games, £33, and a VIC toolkit which includes hi-res graphics facilities and renumber and auto number features and costs £25 with a manual.

## SUPERMARKET

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## A GAMES PLAYERS GUIDE TO THE VIC-20

### FOR AND AGAINST

The VIC 20 has various bad points for the  
user. Other than the obvious 22 column  
problem there is a distinct lack of expansion  
sockets, any expansion being forced  
outside the computer. This implies buying  
expensive motherboards that aren't really  
performing any expansion themselves.

There are a few software nuisances such  
as input prompts being limited to 22  
characters and extra scrolls when writing  
at the bottom of the screen.

The cassette storage system could be  
better. Load and verify errors are not  
logged until the end of a file and the data rate  
is no faster than normal audio techniques  
— the special system used by Commodore  
could be a lot faster without increasing  
errors.

In its defence, the VIC has good Basic  
super graphics and is of good mechanical  
construction. The package seems excellent  
value for money being compatible with the  
Pet and having oodles of add-on peripherals.

The after sale support is a slight consider-  
ing that add-ons, software and literature  
are not really around yet. I had the misfor-  
tune to be caught up in the power unit  
recall by Commodore and their approach  
and speed in this matter could not be  
fancied.

All in all, an excellent machine and well  
worth its purchase.

### PLUG-IN GAMES

One of the VIC-20's great gaming advan-  
tages over other computers is its plug-in  
cartridges.

Commodore is supporting the computer  
with a range of games programs recorded  
on cartridge which plug into the back of  
the machine and include enough extra memory  
for the unexpanded VIC to recreate popular  
arcade games.

These sell for £17.35 (plus VAT) and the  
range is expanding quickly. It includes a  
marvellously accurate copy of arcade space  
invaders (complete with 21-14 flying saucers)  
which sell for the name VIC  
Avenger. And just released a Pacman  
game called Jelly Monsters which com-  
pares well with the arcade original.

Galaxians is to be found in this form as  
Star Battle and my own favourite is a Rally  
X variant called Rat Race. Also out are  
Alien, Road Race, Super Lander and Super  
Slip.

Due out soon in cartridge are a series of  
five Scott Adams Adventures including  
Adventure and Mission Impossible and an  
exciting and imaginative Pinball game.

Commodore has taken its time to bring  
these games out but it is aiming for a high  
quality rather than quantity and in the case

of Avenger, Rat Race Jelly Monsters and  
Star Battle has succeeded in this aim.

Arfon Micro hopes to have a range of  
cartridges available for the VIC ready by  
this summer. Similar to the Commodore  
games cartridges and costing around £30  
the Welsh firm has plans for a dozen games  
initially, including space invaders  
Richochet and City Bomber.

### WRITTEN WORDS

The time to write books on the VIC has  
been short but there is already a selection  
on sale rushed out to meet demand.

Getting Acquainted With Your VIC-20 is  
by Tim Hartnell, author of a book going by  
the same name for the ZX81. It costs £5.95  
and is obtainable from Kuma Computers, 11  
York Road, Maidenhead, Berkshire.

The VIC Revealed by Nick Hampshire is  
said by some buyers not to live up to its  
name, causing them confusion. It is pub-  
lished by Nick Hampshire Publications at  
PO Box 13, Lysander Road, Yarnall, Somers-  
et and costs £10.00.

Touching on machine code for those  
users interested in the subject is a book  
called Assembly Language for VIC-20 by Dr  
P. Holmes, price £10.00. Copies can be  
obtained from the author by writing to 21  
Colin Drive, London NW9 6ES. This 200  
page book contains a 8502A instruction set,  
programs, exercises and an assembler list-  
ing.

At the beginner's end of programming  
try Start With Basic on the Commodore  
VIC-20 which costs £4.95. Written by Don  
Munro and illustrated by Bill Tidy it is  
available from Tmy Publishing, 25, Beech  
Hill, Haywards Heath, Sussex.

Sigma Technical Press is planning to get  
in on the act and is in the process of  
compiling a book about the VIC-20 but  
precise details are not yet available.

Commodore publishes several books of  
the machine, including Learn Computer  
Programming with the Commodore Vic by  
L. Carter and E. Hansen which costs £1.95  
the VIC-20 Programmer's Reference Guide  
is by A. Finkel, N. Harris, P. Higginbottom  
and M. Tomczyk. It costs £14.95.

Commodore also produces books with  
demonstration cassettes to help users get  
the most out of the computer. Introduction  
to Basic (part 1) costs £14.95 and the  
Programmer's Aid Cartridge gives 20 extra  
command words to help make the pro-  
grammer's life easier. It includes advice on  
using the function keys and includes AUTO  
TRACE, RENUMBER and MERGE com-  
mands. It costs £34.95.

A Machine Code Monitor cartridge or  
book helps the user get to grips with 8502A  
assembly language. It has assembly  
disassembly, hex dump, relocate, break-  
point and transfer among its features. It  
costs £34.95.

**ADVENTURE:** A type of game in which the player has to take a character role and retrieve a number of treasures or objects by a trial and error process giving instructions to the computer. The player encounters a variety of hazards often taking the form of dangerous monsters, wizards and animals. Some Adventure games are so complex that they take weeks or months to solve. Adventure games were originally written for massive mainframe computers.

**ARRAY:** A series of items — data or information — arranged to form a meaningful pattern.

**BASIC:** The most widespread computer language which is one of the easiest to learn and is used on all microcomputers.

**BUG:** A slang term given to a mistake in a computer program which prevents it from working. It can refer to a mechanical, electrical or electronic fault.

**CHIP:** A tiny piece of silicon which holds all the components which make up a microprocessor.

**COMPUTER PROGRAM:** A specified set of instructions which perform an operation or task for the computer user.

**COMPUTER LANGUAGE:** A language is used when writing programs and is vital for making the computer perform operations. A language consists of computer instructions or commands. There are different types of languages for carrying out different tasks.

**CONCATENATION:** To unite in a series, to form a link or a chain.

**HARDWARE:** The general term given to all pieces of electronic and mechanical devices which make up a computer system, i.e. the actual machines.

**HIGH RESOLUTION GRAPHICS:** Graphics which can be reproduced in great detail or to a high degree of accuracy.

**KILOBYTE:** A measurement of memory capacity 1024 bytes of memory, so 8K is equivalent to 8192 bytes.

**LOOP:** A basic function referring to the repeated execution of a series of instructions for a fixed number of times.

**MACHINE CODE:** The term used to refer to symbols or numbers assigned to parts of a machine. It is the same as operation code which is the symbol

telling the computer which operation to perform. When a game is written in machine — sometimes known as assembly language — it speeds up the action.

**MAINFRAME COMPUTER:** The jargon word used to describe a very large computer capable of storing a vast amount of information in its memory banks.

**MICROCOMPUTER:** A tiny computer consisting of hardware and software. The main processing blocks are made of semiconductor integrated circuits.

**MINICOMPUTER:** A small computer system which gives higher performance than a microcomputer, costs more, has richer instruction sets and a proliferation of high level languages and operating systems.

**OPERATING SYSTEM:** Firstly, this can be used to describe an organised collection of techniques and procedures for operating a computer. Secondly, it refers to a part of a software package — the program or routine — defined to simplify procedures including input/output and data conversion routines.

**PERIPHERALS:** Equipment which is used with a computer system, e.g. printers, disc drives, and VDU's.

**PSEUDOCODE:** Computer instructions written in a symbolic language by the programmer which must be translated into machine language.

**RAM (Random Access Memory):** This is a memory chip which you can load programs and data to and from.

**ROM (Read Only Memory):** A memory chip which can only be read from but not written into after the initial data has been input.

**ROUTINE:** A set of coded computer instructions used for a particular function in a program.

**SOFTWARE:** Another name for computer programs. It can also refer to computer documentation.

**STRUCTURED PROGRAMMING:** A set of techniques designed to increase the reliability and comprehensibility of programming by making the programmer more disciplined.

**SUBROUTINE:** A computer program routine that is translated separately.

**VOU (Visual Display Unit):** A monitor, like a television, which is connected to a computer and is used to display information from the system's memory.

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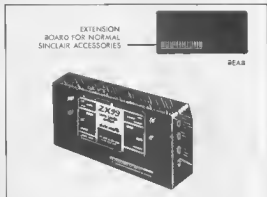
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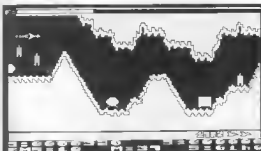
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- \* LOAD load image of memory contents as file
- \* SAVE save image of memory contents as file
- \* DELETE delete file from disk
- \* SPOOL store all print characters on disk
- \* EXEC read characters from disk as if from keyboard

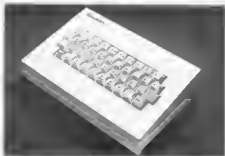
The DOS also replaces the cassette operating system vectors as used by BASIC to allow the use of the following commands in Atom BASIC:—

- LOAD load BASIC program from disk
- SAVE save BASIC program to disk
- FOUT open file for output
- FIN open file for input
- SHUT close file
- EXT find extent of file
- PRT find value of pointer into file
- PUT put number to file
- SPUT put byte to file
- SPUT put string to file
- GET get number from file
- BGET get byte from file
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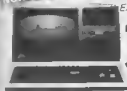
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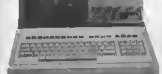
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